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DRAFT FINAL
FEASIBILITY STUDY REPORT

BLACKBURN & UNION PRIVILEGES
SUPERFUND SITE
Walpole, Massachusetts

June 2008

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ABBREVIATION AND ACRONYM LIST

%	Percent
>	Greater Than
AMSL	Above Mean Sea Level
AOC	Area of Containment
ARARs	Applicable or Relevant and Appropriate Requirements
AST	Above Ground Storage Tank
AVOCs	Aromatic Volatile Organic Compounds
BERA	Baseline Ecological Risk Assessment
bgs	Below Ground Surface
BHHRA	Baseline Human Health Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, and (m,p,o) Xylenes
BVW	Bordering Vegetated Wetland
CARB 435	Method 435 of the California Environmental Protection Agency Air Resources Board Determination of Asbestos Content of Serpentine Aggregate
Canonie	Canonie Environmental Services Corporation
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
cfs	Cubic Feet per Second
CMA	Contaminated Media Management Area
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
COPEC	Contaminant of Potential Ecological Concern
Cosmec	Cosmec, Inc.
DAPL	Dense Aqueous Phase Liquid
EDRA	Existing Data Review and Analysis Report
ºF	Degrees Fahrenheit
FS	Feasibility Study
ft	Feet
ft^2	Square Feet
ft^3	Cubic Feet
gpm	Gallons per Minute
GPR	Goldsmith, Prest & Ringwall, Inc.
GWCB	Groundwater Compliance Boundary
HDPE	High Density Polyethylene
HI	Hazard Index
ILCR	Incremental Lifetime Cancer Risks
Kendall	The Kendall Company
LELs	Lowest Effect Levels
LM	Limited Manufacturing

LOAEL	Lowest Observed Adverse Effects Level
LOED	Lowest Observed Effects Dose
LUW	Land Under Water
M&E	Metcalf & Eddy, Inc.
MADEP	Massachusetts Department of Environmental Protection
MCLs	USEPA National Primary Drinking Water Standards Maximum Contaminant Levels
MSWQSs	Massachusetts Surface Water Quality Standards
MTBE	Methyl Tertiary Butyl Ether
NCDC	National Climatic Data Center
NCP	National Oil and Hazardous Substances Contingency Plan
ND	Not Detected (Above Laboratory Detection Limits)
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observed Adverse Effects Level
NOED	No Observed Effects Dose
NRWQC	National Recommended Water Quality Criteria
Order	Administrative Order by Consent
OSWER	USEPA Office of Solid Waste and Emergency Response
PAHs	Polycyclic Aromatic Hydrocarbons
PBL	Probability
PLM	Polarized Light Microscopy
POCs	Points of Compliance
ppm	Parts per Million
PRGs	Preliminary Remediation Goals
RA	Removal Action
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Remedial Investigation / Feasibility Study
ROW	Right of Way
s.u.	Standard Units (pH)
SHA	Sanborn, Head & Associates, Inc.
Shaffers	The Shaffer Realty Nominee Trust and BIM Corporation
Site	Blackburn & Union Privileges Superfund Site
SSD	Sub-Slab Depressurization
SVOCs	Semi-Volatile Organic Compounds
TBCs	To-be-Considered Guidelines
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEM	Transmission Electron Microscopy
Tyco	Tyco Healthcare Group, LP
µg/dL	Micrograms per Deciliter

USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds
Work Plan	Work Plan for The Phase IA Remedial Investigation for the Blackburn and Union Privileges Superfund Site, Walpole, Massachusetts

1.0 INTRODUCTION

This Feasibility Study (FS) for the Blackburn & Union Privileges Superfund Site in Walpole, Massachusetts (Site) was prepared by the United States Environmental Protection Agency (EPA), with assistance from its oversight contractor, Metcalf & Eddy, incorporating the results of a draft FS completed by Sanborn, Head & Associates, Inc. (SHA). The FS incorporates additional EPA investigation and analysis, including an addendum to the SHA Baseline Human Health Risk Assessment Report prepared by EPA and M&E. SHA prepared the draft FS Report - inclusive of the Baseline Ecological Risk Assessment [BERA] Report, Baseline Human Health Risk Assessment [BHHRA] Report (all prepared by SHA), and Metcalf & Eddy, Inc.'s [M&E's] Data Evaluation Report for Additional Asbestos Investigations) were submitted under separate covers.[1]

1.1 Purposes and Organization of the Report

The objectives of the FS are to:

- Review the applicability of various remedial technologies, including innovative technologies, to determine whether they are appropriate and technically implementable remedies for the Site.

- Identify the Remedial Action Objectives (RAOs) using the BHHRA and BERA and other assessments.

- Use short- and long-term aspects of the following three criteria to guide the development and screening of remedial alternatives: 1) effectiveness; 2) implementability; and 3) cost.

- Evaluate each of the Site alternatives or combination of alternatives that represent viable approaches to remedial action after the screening stage through a detailed and comparative analysis based upon the seven threshold and balancing evaluation criteria listed in the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA[2]."

[1] "Version 03F Draft Remedial Investigation Report for the Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts," (4 volumes) dated March 30, 2007 (SHA, 2007a); "Addendum to the Remedial Investigation Report - Phase 1B-4/1B-5 Investigations, Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts" (3 volumes) dated December 2007 (SHA, 2007b); "Baseline Ecological Risk Assessment Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts" by The Science Collaborative, dated March 9, 2007 (Appendix F of the RI Addendum Report); "Baseline Human Health Risk Assessment Version 02 DRAFT Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts" by The Science Collaborative-North Shore, dated March 23, 2007 (Appendix G of the RI Addendum Report); "Data Evaluation Report for Additional Asbestos Investigations, Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts" by M&E, dated September 2006.

[2] USEPA, 1989, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/004.

The FS also includes conceptual design elements, engineering analyses, cost analyses, and an analysis of time frames for the achievement of the RAOs.

This Report is organized as follows:

- The Executive Summary provides a summary of the analyses and findings of the FS.

- Section 1.0 – Introduction, describes the purpose of the FS and provides background information on Site description, history and previous environmental activities completed; provides summaries of Site hydrogeology, and contaminant distribution, transport and fate as they relate to human health and ecological risks.

- Section 2.0 – Remediation Objectives and Approach, documents development of RAOs, General Response Actions, and volumes of contaminated media; and presents the factors that will be considered in assessing the need for remediation, the applicability of remedial technologies and process options, and the development and evaluation of remedial alternatives. Contaminants of concern (COCs), preliminary remediation goals (PRGs) and areas/volumes of contaminated media are identified as part of the development of RAOs.

- Section 3.0 - Screening and Evaluation of Technologies and Process Options, presents further evaluation and screening of remedial technology process options for soil, sediment, soil vapor, and groundwater/surface water.

- Section 4.0 - Development of Remedial Action Alternatives, provides the rationale for the development of the remedial alternatives, and describes the alternatives developed. Applicable or relevant and appropriate requirements (ARARs) and to-be-considered guidelines (TBCs) for each of the remedial alternatives are presented in this section.

- Section 5.0 - Detailed Analysis of Alternatives, presents the analysis of each of the remedial alternatives against the set of seven threshold and balancing evaluation criteria described in the National Oil and Hazardous Substances Contingency Plan (NCP), and a comparative analysis between the various alternatives.

1.2 Site Background

A general Site description and history are provided below in brief summary format. For additional information regarding the Site and Site history, the reader is referred to "Existing Data Review and Analysis Report" (EDRA [SHA, 2000b]), the RI Report, and RI Addendum Report. Much of the information contained in the EDRA and RI Report is not repeated herein.

1.2.1 Site Description

As shown on Figure 1, the Site is located just south of the intersection of South Street and Common Street, approximately one-half mile south-southeast of the center of Walpole, Massachusetts. As depicted on Figure 2, South Street approximately bisects the Site in a

generally north-south direction, and the Neponset River approximately bisects the Site in a generally east-west direction.

The Site, as defined in the Order, includes 21 parcels of land as defined in 1999[3] over an area of approximately 22 acres. The Site consists of both On-Facility properties and Off-Facility properties, and other areas where contamination has come to be located. The On-Facility properties are currently owned by various Shaffer interests, including Shaffer Realty Nominee Trust and the BIM Investment Corporation (collectively, the Shaffers). These properties, consisting of the following Walpole Tax Map parcels, have been the locus of various industrial activities spanning several hundred years:

- On-Facility parcels located east of South Street currently occupied by Cosmec, Inc. (Cosmec): Lots 33-126, 33-127, and 33-128[4]; and
- On-Facility parcels located west of South Street including: Lots 33-172, 33-173, 33-174, and the northeastern portions of Lots 33-165-3, 33-165-10, 33-165-11, and 33-165-14.
- Off-Facility parcels, which have historically been undeveloped or residential and are owned by various entities, including Off-Facility parcels located east of South Street:
    - Lots 33-119, 33-120, and 33-121, which make up the railroad right-of-way (ROW);
    - Lots 33-122, 33-123, 33-124, and 33-125, located along Gleason Court; and
    - Lots 33-129, 33-130, 33-137, and 33-138; and
- Off-Facility parcels located west of South Street:
    - Lots 33-208 and 33-209, located within the wetland/Former Mill Tailrace area; and
    - Lot 33-259 (also know as the Orlando Property).

In addition, several lots were identified in the vicinity of Lewis Pond and include:

- Lot 33-364, which is the Lewis Pond lot; and
- Lots 33-257, 33-342, 33-348 1 / 2, 33-350, 33-360, 33-361, and 33-363, which are residential lots located adjacent to Lewis Pond.

A Site Vicinity Plan is provided as Figure 2; a Site Features Plan, including topography and Site features locations is included as Figure 3. Key site features, which may be discussed in further detail in this report include:

[3] For purposes of this Report, current Walpole Tax Map information is referenced. The current Walpole Tax Map indicates that 24 parcels are included in the definition of the Site.
[4] For purposes of this Report, current Walpole Tax Map parcel numbers are referenced. These are not the same as those lot numbers referenced in the Order. Refer to Appendix Table G-1 from the RI Report for a summary of new and old Walpole Tax Map parcel numbers, for reference.

- The **Neponset River** was the site of the earliest industrial development in the Town of Walpole. In 1811, the **Blackburn Privilege** was reportedly established on the upstream portion of the Site, east of **South Street**, and in approximately 1812 the **Union** or **Union Factory Privilege** was established on the downstream portion of the Site, west of South Street. The term privilege refers to a grant enabling commercial usage of the Neponset River for water supply and power

- **Lower Mill Pond** (also known as [a/k/a] Union Pond), which was created by a dam located at South Street (a/k/a the **Union Dam**) on the Neponset River, was a predominant site feature between approximately 1904 and 1958. Water was diverted from the dam through a canal constructed just north of the Neponset River, through a powerhouse and then a tailrace before discharging back in the Neponset River west of the Site in the area currently referred to as the **Former Mill Tailrace**. Information included in the EDRA (SHA, 2000b) indicates that the Union Dam failed in 1959. Information included as Figure 9 of the EDRA suggests that the headrace to the powerhouse and much of the tailrace were likely filled sometime between 1918 and 1926.

- Further upstream of the Site, the **Blackburn Pond** (south of Lot 33-137), created by the **Blackburn Dam** is present. The history of this Pond and dam are not well known, but are features referenced for their location.

- **Lewis Pond** is located approximately 0.7 miles northwest of the Site and is present as a result of the dam in the Neponset River at **West Street (i.e., the West Street Dam).**

- West of South Street, the **Former Mill Building** is currently unoccupied. Formerly, this building was used for a number of industrial purposes, including by the Standard Woven Fabric Company, the name of which was changed to Multibestos Corporation, a manufacturer of asbestos clutch and brake linings; and The Kendall Company (Kendall), which operated a cotton mercerizing operation at the Site. The property is currently owned by the Shaffers.

- East of South Street, the five buildings on the industrial portion of the Site are occupied by **Cosmec Inc.**, which currently maintains foundry operations.

- During Kendall's occupation of the Site, wastewater discharges from on-Site operations were treated in a **neutralization tank** (a/k/a **mixing tank**) located at the southwest corner of the former Kendall facility. Neutralized wastewater was then discharged to one of two settling basins (**Settling Basin #s 1 and 2**) prior to discharge to the Walpole sanitary sewer.

- As described below, during the 1992 asbestos **Removal Action**, asbestos-containing soil (at levels >1%) excavated from various areas of the Site was consolidated on-Site with existing asbestos-containing soil in an area located south of the former mill building. In addition, excavated asbestos-containing soil from the Former Mill Tailrace was stabilized using Portland cement and consolidated in a high density polyethylene (HDPE)-lined containment cell constructed in former Settling Basin No. 2 west of the former mill building (**Settling Basin #2 Containment Cell**). These areas south and west of the former

mill building, along with an existing area of asbestos-containing soil north of the former mill building which was covered, have been designated the **Area of Containment** (AOC). South and west of the former mill building, the AOC is capped with grass cover growing on six inches of clean topsoil, placed over 24 inches of clean sand; north of the mill building, the AOC is covered with an asphalt cap. The AOC is subject to deed restrictions limiting its disturbance and its perimeter is surrounded by an eight-foot high barbed-wire security fence.

- In addition, during the 1992 Removal Action, an aluminum plate arch **culvert,** approximately 400 feet in length, was installed along the original alignment of the Neponset River through the AOC to prevent potential future erosion of asbestos-containing soils from the banks of the Neponset River in this area. The culvert was covered with contaminated soil, followed by clean cover soil.

1.2.2 Site History

As described in the EDRA and RI Report, On-Facility portions of the Site have been the locus of various industrial activities spanning several hundred years. From the mid- to late-seventeenth century to circa 1891, On-Facility portions of the Site were used for a variety of manufacturing purposes, including: a sawmill, corn mill, snuff factory, forge, tan yard, and cloth manufacturing; processing of cotton and wool; and manufacturing of mattresses, cotton batting, lamp wicks, and carpet linings. Between circa 1891 and 1915, the Site was used for manufacture of tires, rubber goods, and insulating materials. The Site was used to manufacture asbestos clutch and brake linings between 1915 and 1935. Subsequently, the Site was again used for a variety of manufacturing purposes, including: manufacturing of non-woven cotton products, dye flocking of cotton, manufacturing of instant coffee, and rag and paper recycling.

The manufacturing of non-woven cotton products from approximately 1946 to 1984 included the use of substantial quantities sodium hydroxide. As described in the RI Report and EDRA Report, approximately 1,000 to 3,000 gallons per day of sodium hydroxide were used at the Site as part of the cotton mercerizing and bleaching processes associated with the production of the non-woven cotton products.

On-Facility portions of the Site to the west of South Street are currently vacant. As noted above, Cosmec currently maintains foundry operations east of South Street. The EDRA Report contains a detailed description of the Site history, and includes historical timelines to help place the Site history into perspective.

In the EDRA Report and the RI Report, the Site was apportioned into a number of horizontally-stratified areas, with the probability of environmental impact noted qualitatively for each area on the basis of historical Site use. These areas are shown on Figure 2, and include the following:

Manufacturing Areas with Current Evidence of Contamination - These include two areas at the Site. The first area is located west of South Street, and includes the property in the vicinity

of the former mill building, and the AOC. The second area, located on the east side of South Street includes Lots 33-126 and 33-127. Both areas have an extensive industrial history, and data obtained as part of pre-removal action investigations indicated the presence of contamination within each of these areas.

The area west of South Street is currently unoccupied; current and future land use in a substantial portion of this area (the AOC) is already subject to deed restrictions to ensure that the protective soil- and asphalt-caps and the culvert are not disturbed. The area east of South Street is currently used for manufacturing operations by Cosmec and is zoned in a Limited Manufacturing zone, which includes both industrial and child-intensive uses.

Lower Mill Pond - Historical information indicates that the Lower Mill Pond covered Lot 33-128 and portions of Lots 33-129 until 1959. As such, there is no indication of manufacturing activities in this area prior to 1959, nor is there historical information to suggest that manufacturing activities have occurred in this area since that time.

Areas Peripheral to Manufacturing Activities - Both historical information and existing chemical data indicate that areas peripheral to manufacturing activities have a low potential for significant levels of chemical constituents. These areas include the northern portion of Lot 33-174, which has historically been used for residential purposes or as a vacant lot and only in more recent times as a support area for certain manufacturing operations; portions of Lots 33-173, 33-208, 33-209, and Lots 33-165-3, 33-165-10, 33-165-11, and 33-165-14; and the former railroad ROW, Lots 33-119, 33-120, 33-121.

Historically Residential or Undeveloped Properties - Historical information indicates that a number of properties included in the definition of the Site have been residential or undeveloped historically and continue to be so at this time. Although asbestos was detected in soil samples from limited areas of Lots 33-123 and 33-259, the 1992 Removal Action was effective in removing asbestos-containing soil (with >1%) from these lots. All asbestos concentrations detected in soil samples from residential/undeveloped Lots 33-122, 33-124, and 33-125, were less than 1% in soil.

In addition to the above-described areas, Lewis Pond was identified as an area of interest because it was assumed to be a depositional area that might contain sediments contaminated as a result of historic activities at the Site.

1.2.3 Site Investigations and Remedial Actions

Environmental investigations to review possible impacts to the Site engendered by historical industrial activities were initiated in 1985, and were generally carried through 1990. Environmental data were also generated as a result of historical above ground and underground storage tank (AST and UST) closure and removals (primarily in 1987), and the Removal Action conducted primarily in 1992 by Canonie Environmental Services Corporation (Canonie) to address the presence of asbestos-contaminated soil at the Site. The reader is

referred to the EDRA Report for a more detailed description of previous investigations and remedial actions.

In 1999, SHA initiated the RI at the Site. The reader is referred to the RI Report and RI Addendum Report for a summary of investigations completed as part of the RI. The purpose of the RI was to evaluate the nature and extent of contaminants of potential concern (COPCs) in various media at the Site, and to evaluate the potential risks that these COPCs may pose to human health or the environment. In general, the RI consisted of the following:

1. A review of background information and previous environmental activities completed at the Site;
2. Completion of multiple field investigations with associated laboratory analyses;
3. An evaluation of the quality of the data collected as part of the RI;
4. An evaluation of the physical characteristics of the Site;
5. An evaluation of the nature and extent of the COPCs detected at the Site;
6. An evaluation of the transport and fate of the COPCs detected at the Site; and
7. An evaluation of the potential risk that these COPCs pose to human health or the environment (i.e., ecological receptors).

Figures 4 through 8 summarize soil boring, monitoring well, surface water, sediment, and soil vapor exploration locations completed during the RI.

1.3 Site Conditions and Hydrogeology

The following is a summary of the Site conditions and hydrogeology as described in the RI Report.

1.3.1 Site Climate

The average wintertime high temperatures vary between approximately 17 and 40 degrees Fahrenheit (ºF), while average summertime high temperatures are generally around 80ºF. The National Climatic Data Center (NCDC) data indicate that the average annual precipitation is approximately 47 inches and is nearly equally distributed between the warmer half and colder half of the year. Annual snowfall can be over 50 inches, and snow cover normally lasts from mid- to late-December until approximately the last week of March. Bare ground is not unusual in the winter, and during some years, snow remains on the ground later into the season.

1.3.2 Site Geology

Our understanding of Site geologic conditions is based on observations made during the completion of approximately 4,000 linear feet of overburden and bedrock test borings, combined with observations of surface exposures of Site soils in the area of the Neponset River.

The following sequence briefly describes the Site geology from shallowest to deepest units encountered:

- **Soil fill** underlies much of the developed portion of the Site. In general, the fill appears to consist primarily of reworked sand/sand and gravel, or glacial till soils with variable amounts of other miscellaneous fill materials such as brick, wood, concrete, ash, metal, plastic, and glass. The thickness of soil fill encountered across the Site varies from about one foot to as much as 23 feet. Portions of the fill are saturated, with the largest area of saturated fill coinciding with the soil-capped portion of the AOC.

- **Stream and floodplain deposits** are reworked soils consisting of late-glacial alluvium and post-glacial swamp deposits of sand, silty sand, and sand and silt interbedded with organic silt or peat, related to the Neponset River and its tributaries. Soil grain size is predominately fine to coarse sand and/or gravel, and trace amounts of silt and clay. These soils are either exposed at the ground surface (in areas proximate to the Neponset River floodplain) or are located beneath soil fill, and are typically less than 4 feet thick. In general, the thickness of these deposits is inferred to be greatest proximate to the existing and former drainage channels of the Neponset River. Under conditions normally observed at the Site, the stream and floodplain deposits are typically saturated.

- **Ice-contact sand/sand and gravel sediments** were deposited during subsequent stages of glaciation by a combination of glacial ice and glacial meltwater streams. These sediments consist of poorly to well-sorted silty sand, sand, and sand and gravel, of varying density. Major constituents are either sand or gravel with little to trace amounts of fines. Localized horizons of finer-grained silty sand, sand and silt, or silt have been identified beneath portions of the Site, as well as horizons primarily consisting of cobbles and boulders. This stratum occurs across much of the Site with the exception of an area of shallow glacial till directly north of the wetland and Former Mill Tailrace, and an area in the central portion of the AOC. Where present, the layer ranges in thickness to greater than 40 feet. Sand and gravel soils have generally been differentiated from glacial till on the basis of lesser fines content, the localized presence of thin stratified horizons, and/or a slightly lower density. However, due to the heterogeneous texture and very dense nature of the ice-contact sand/sand and gravel at the Site, differentiating between some portions of this stratum and the underlying glacial till is difficult. In general, the ice-contact sand / sand and gravel deposits are typically partially or fully saturated throughout the Site. The groundwater contained in this unit is referred to as overburden “shallow” groundwater.

- **Glacial Till** is material deposited directly from glacial ice as a discontinuous layer during continued advance, retreat, and readvance of glacial ice in the region. Results of drilling using conventional split-spoon sampling methods as well as sonic and air rotary drilling methods indicate the till stratum beneath the Site is very dense, and is heterogeneous in texture. Portions of soil cores of the till obtained during sonic drilling were often difficult to break apart, approaching the consistency of concrete. The texture of the till varies both laterally and vertically from sand-rich to silt-rich, but generally consists of a heterogeneous mixture of sand, silt, gravel, and clay with lesser amounts of cobbles and boulders. Some

of the boulders encountered using sonic drilling methods were greater than 20 feet in diameter and appeared highly weathered. Grain size results indicate the glacial till stratum typically has a greater percentage of clay and silt as compared to the sand/sand and gravel stratum. In general, the glacial till soils encountered ranged in thickness from about 10 feet to 64 feet, and are typically fully saturated throughout the extent of the Site. The groundwater contained in the till unit is referred to as overburden "deep" groundwater.

- **Bedrock** - Sedimentary rock types encountered beneath the Site typically include: shale; quartzofeldspathic sandstone; siltstone; fine- to coarse-grained pebble conglomerate; and a coarse-grained granule conglomerate. The degree of weathering of these rock types varies across the Site. The depth to bedrock encountered beneath the Site ranged from about 14 to 80 feet below ground surface (bgs). Groundwater occurrence in Site bedrock is typically dependant upon and occurs within fractures. Groundwater contained in the bedrock unit is referred to as "bedrock" groundwater.

1.3.3 Site Hydrology

1.3.3.1 Surface Water

There are several surface water bodies at and in the vicinity of the Site including:

- The **Neponset River**, flows through the AOC in the aluminum culvert installed during the 1992 Removal Action.

- The reconstructed wetland/remnant of the **Former Mill Tailrace** located west of the AOC, which is connected to the Neponset River.

- **Lewis Pond** is an impounded section of the Neponset River, behind the West Street dam, with a relatively large floodplain, located northwest of the industrial portions of the Site.

The discharge of the Neponset River measured during an April 2001 stream gauging event was approximately 60.8 cubic feet per second (cfs); the discharge of the Neponset River measured during an August 2001 stream gauging event was approximately 3.6 cfs.

1.3.3.2 Groundwater Flow Conditions

Figures 9, 10, and 11 depict groundwater elevation contours for shallow, deep, and bedrock groundwater, respectively for the September 2006 water level round. The following general observations are made regarding Site groundwater flow conditions:

- Shallow overburden groundwater at the Site generally flows to the west to northwest (Figure 9).

- Deep overburden groundwater generally flows in a westerly direction until reaching the central portion of the Site (approximately the well SH-01D location), while west of this area, groundwater generally flows northwest (Figure 10).

- In the vicinity of monitoring well SH-01D is an area of apparent converging groundwater flow that is likely a result of the presence of high pH fluids - dense aqueous phase liquid (DAPL [i.e., pHs above about 12.5 standard units {s.u.}]). These fluids have a density greater than ambient groundwater. This density contrast between DAPL and ambient groundwater likely inhibits mixing of DAPL and ambient groundwater in a manner similar to that of a salt water / fresh water interface in coastal aquifers. Based on hydrologic and chemical data, it is expected that a relatively distinct boundary between DAPL and ambient groundwater exists at the Site with limited mixing occurring between the DAPL and ambient groundwater. Hence, this limited mixing of DAPL with ambient groundwater, and the increased density of DAPL relative to ambient groundwater results in lower water levels that result in an area of converging flow in the vicinity of SH-01D.

- Bedrock groundwater at the Site generally flows in a west-northwesterly direction (Figure 11).

- In general, downward vertical gradients were observed in upland areas of the Site (e.g., on the AOC and the area east of South Street), indicating expected recharging conditions. Upward vertical gradients are prevalent in westerly portions of the Site and near the wetland areas (e.g., west of the AOC and the Former Mill Tailrace), indicating discharge conditions.

- Both horizontal and vertical groundwater flow conditions indicate that Site groundwater discharges to the Former Mill Tailrace and nearby Neponset River.

- As documented in the RI Report and RI Addendum Report, multiple water level measurement rounds conducted from 2001 to 2006 suggest that seasonal fluctuations in water levels have little effect on the overall groundwater flow regime.

1.4 Summary of RI Findings

This section presents a summary of the overall findings and conclusions of the RI regarding the nature and extent of analytes in various matrices at the Site, the transport and fate of these analytes, and the potential risks that these analytes pose to human health or ecological receptors.

The presence and distribution of the highest concentrations of analytes at the Site generally correlates with manufacturing operations that have occurred on portions of the Site over at least the past 100 years, and possibly dating back to the late 17th century. The principal analytes observed at the Site during the RI are elevated pH (defined as pH greater than 9 s.u.), metals, semi-volatile organic compounds (SVOCs – primarily polycyclic aromatic hydrocarbons [PAHs]), and volatile organic compounds (VOCs - with the exception of

trichloroethene [TCE], consisting primarily of aromatic volatile organic compounds [AVOCs]).

In general, the discussion in this section is limited to those analytes that contribute significantly[5] to potential risk to human health or ecological receptors based on the risk assessments summarized in Section 2 of this FS, or where asbestos concentrations in soil or sediment exceed 1%. For complete information about the entire data set collected at the Site, please refer to the RI Report and the RI Addendum Report.

1.4.1 Summary of Analytes in Soil and Soil Vapor

Approximately 145 soil samples[6] and 10 soil vapor samples were submitted for laboratory analysis during the RI. The soil vapor samples were collected to investigate the potential for VOC soil contaminants to migrate into indoor air. Since the analytes detected in soil vapor are directly related to the analytes detected in soil, a discussion related to soil vapor analytes has been included in this section.

1.4.1.1 Contaminated Soils in the AOC

During the 1992 asbestos Removal Action, asbestos-containing soil excavated from various areas of the Site was consolidated on-Site with existing asbestos-containing soil by others in an area located south of the former mill building. In addition, excavated asbestos-containing soil/sediment from the Former Mill Tailrace was consolidated in the HDPE-lined Settling Basin #2 Containment Cell. These areas south and west of the former mill building, along with an existing area of asbestos-containing soil north of the former mill building have been designated the AOC. South and west of the former mill building, the AOC is capped with six inches of clean vegetated topsoil, placed over 24 inches of clean sand; north of the former mill building, the AOC is covered with an asphalt cap. The AOC is subject to deed restrictions limiting its disturbance and an eight-foot high barbed-wire security fence surrounds its perimeter.

In general, the highest concentrations of soil analytes were detected below the AOC. Elevated pH conditions and elevated concentrations of metals, SVOCs (primarily polycyclic aromatic hydrocarbons [PAHs]), AVOCs, and asbestos[7] remain in this area.

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[5] For the purpose of adding perspective to the risk assessment results in the context of the Site characterization results, significant contributions of analytes in Site media are those analytes that present potential adverse ecological effects, and those analytes that contribute to a cumulative incremental lifetime cancer risk (ILCR) greater than 10^{-4} and pose an ILCR of $>10^{-6}$, or pose a non-cancer hazard quotient >1, and/or probability of exceeding a blood lead level >5%.

[6] Note that the BHHRA and BERA consider floodplain sediment (i.e., in the Floodplain Area and Orlando Property) to be "soil" as opposed to "sediment" due to the manner in which receptors are exposed to this matrix. However, the transport and fate of analytes in floodplain sediment is due to migration with surface water and sediment in the Neponset River; therefore, summary discussions related to floodplain sediment have been presented in Section 1.4.1.4.

[7] SHA did not analyze soil samples from the AOC for asbestos; however, given that the AOC was the result of an asbestos Removal Action, elevated concentrations of asbestos in soil are known to be present at that location.

The distribution of metals analytes in soil beneath the AOC is relatively heterogeneous, presumably reflecting historical fill placement practices. In some areas of the AOC, these soils are located beneath the groundwater table. The primary organic analytes detected in AOC soils were PAHs and to a lesser extent AVOCs – predominantly the lighter molecular weight PAHs (naphthalene and 2-methylnaphthalene) and benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds), suggesting petroleum related sources for organic analytes in this area (such as former petroleum related ASTs and USTs located in the AOC), or coal/ash sources.

The risk assessment did not consider soils in the AOC, as this area was addressed as part of the earlier CERCLA Removal Action . An assessment of risk to human health or the environment would indicate potential risk in the absence of the cap, fence, and deed restriction.

1.4.1.2 Soils and Soil Vapor East of South Street

Elevated concentrations of metals, PAHs, and TCE in soil were observed in the East of South Street, Old Railroad, and Former Lower Mill Pond areas of the Site (collectively the East of South Street Area). As depicted on Figure 14A, the highest concentrations of TCE in soil were observed in the northeast portion of the East of South Street Area (near soil boring SB-09). TCE was also observed in soil vapor samples collected in this area (Figure 14B). However, elevated concentrations of TCE detected in the northeast portion of the East of South Street Area were limited to within approximately 15 feet of soil boring SB-09, suggesting a relatively localized area of elevated concentrations of TCE in soil and soil vapor. Notably, soil vapor samples collected from along the property boundary with the residential lots on Gleason Court contained relatively low concentrations of VOCs. Accordingly, as described below, no significant risk to current residents from vapor migration to indoor air on Gleason Court was identified.

There is no significant risk predicted to current human receptors from the elevated concentrations of analytes in soil or soil vapor in the East of South Street Area of the Site.

With regard to possible future scenarios, there are potential risks to hypothetical future human receptors in the East of South Street Area, which are summarized below:

- *Carcinogenic PAHs and arsenic* concentrations in soil pose potential cancer risk from direct contact with soil for a potential future resident at the East of South Street Area. In addition, arsenic concentrations in soil pose potential non-cancer hazard from direct contact with soil and ingestion of garden produce for a potential future resident at the Old Railroad and Former Lower Mill Pond Portions of the East of South Street Area. Figures 12 and 13 depict the distribution of total PAHs in shallow (0-1 ft bgs) and deep (1-10 ft bgs) soils, respectively. Figures 15 and 16 depict the distribution of arsenic in shallow and deep soils, respectively.

- *Trichloroethene* concentrations in soil pose potential carcinogenic risk from inhalation of indoor air in the northeast portion of the East of South Street Area for a potential future

resident or Site worker. Figure 14A depicts the distribution of TCE in soil in the East of South Street Area. Figure 14B depicts the distribution of TCE in soil vapor in the East of South Street Area.

Outside of the AOC, the only area of the Site where soil with asbestos concentrations greater than or equal to 1% has been observed is at one sample location on the East of South Street Area (refer to Figure 17) [8].

A risk assessment to evaluate risks from inhalation of asbestos in soil becoming airborne for a current and future resident, current trespasser, current and future site worker, and future construction worker was conducted by EPA (Appendix B-1). This risk assessment was based on data from activity-based sampling performed at the Site in an area previously determined to be at an asbestos level of <1% in soils (Appendix B-2). The risk assessment demonstrated that any asbestos in soil that may be present in air through activities such as raking or mowing did not pose an unacceptable risk under CERCLA.

At the remainder of the residential parcels, including Lots 33-130, 33-137, and 33-138, asbestos was not detected in soil at concentrations greater than the detection limit of 1%. Based on the activity-based sampling conducted, it was determined that exposures to airborne asbestos in these areas also did not pose unacceptable risks under CERCLA.

There is potential ecological risk to terrestrial birds and/or small mammals from elevated concentrations of aluminum, lead, selenium, vanadium, and zinc in soils east and west of South Street. These potential ecological risks are compared to background risks (e.g., the potential risks in the soil reference area) in Section 2 of this report.

1.4.2 Summary of Analytes in Groundwater

With a few exceptions, relatively elevated pH and other groundwater analyte concentrations are limited to the area beneath the AOC and the Former Mill Building, extending to the Neponset River in the vicinity of the Former Mill Tailrace.

Historical releases of sodium hydroxide have resulted in the formation of a zone of significantly elevated pH conditions beneath the AOC and the Former Mill Building (refer to Figures 18 through 20). Although the original sodium hydroxide source was eliminated over 20 years ago with termination of manufacturing activities, sodium hydroxide DAPL (pH conditions greater than approximately 12.5 s.u.) resides beneath and proximate to the westerly-extending wing of the Former Mill Building (where the former sodium hydroxide ASTs and the former bleachery were located).

[8] Note that SHA did not collect these samples. These samples were collected by USEPA's oversight contractor (M&E) as part of a soil and sediment sampling program aimed at further delineating the extent of asbestos in these matrices. Refer to M&E's Data Evaluation Report for Additional Asbestos Investigations in Appendix I for further detail.

The DAPL is limited in lateral and vertical extent to groundwater from deep overburden and shallow bedrock within the AOC. The increased density of the DAPL causes these fluids to migrate downward in the subsurface generally under the influence of gravity. The density and viscosity contrast between DAPL and ambient groundwater also likely inhibits mixing of DAPL and ambient groundwater; such that the DAPL has remained in the subsurface for decades. The DAPL serves as a source of sodium hydroxide to ambient groundwater. Accordingly, a plume of elevated pH (elevated pH is defined as pH greater than 9 s.u.) in groundwater extends westerly from the DAPL source to where groundwater discharges to the Former Mill Tailrace and nearby Neponset River (refer to Figures 18 through 20).

Metals, PAHs, and VOCs are also present in groundwater beneath the Site at elevated concentrations, primarily within and extending downgradient of the AOC, and generally coinciding with or in close proximity to the elevated pH plume. Some metals and organic analytes are also present at elevated concentrations in soils in the elevated pH area, apparently due to a general co-location of their source areas with the elevated pH source area.

The elevated pH, metals, PAH, and AVOC conditions in groundwater are likely well evolved (at "steady-state"). These conditions are expected to remain relatively consistent, with slow attenuation, for an extended time frame likely lasting several decades or more.

Currently, there are no human or ecological receptors that are exposed to Site groundwater. Existing public and private wells in Walpole are located at least 500 feet from this steady-state groundwater plume and thus are not likely to be impacted in the future by contaminated Site groundwater.

With regard to future scenarios, there is potential risk to a hypothetical future construction worker coming into contact with groundwater with elevated pH conditions in the industrial area west of South Street, and on Lots #33-208/209. Use of site groundwater at tap water is currently prohibited, since no wells can be installed under the existing deed restriction in the Area of Containment. The potential risk from Site groundwater being used as tap water by hypothetical future residents beyond the boundary of the waste management areas was assessed, and resulted in risk being predicted from pH, metals, PAHs, and/or VOCs if the contaminated groundwater were to move beyond the industrial areas east and west of South Street, and on Lots #33-208/209.

1.4.3 Summary of Analytes in Surface Water

As described previously, groundwater from the Site migrates from the industrial portions of the Site towards the Neponset River. The discharge area for impacted groundwater is the Former Mill Tailrace and nearby Neponset River. Consequently, the highest concentrations of analytes in surface water were observed in the Former Mill Tailrace, including elevated pH and elevated concentrations of metals and PAHs. With the exception of a few metals (iron, arsenic,

barium, and manganese) that are likely associated with background[9] concentrations in surface water, no analytes were detected at concentrations above human health or ecological screening levels in the Neponset River. Accordingly, while groundwater with elevated analyte concentrations discharges to the Former Mill Tailrace and nearby Neponset River, this groundwater discharge has only adversely impacted surface water quality within the Former Mill Tailrace and has not adversely impacted surface water quality in the Neponset River.

There is potential risk to a wader in the Former Mill Tailrace due to elevated pH conditions in surface water in this area. This potential risk is based on exceedances of pH criteria, not on a calculated human health risk or hazard. No other significant current or potential future risks to human receptors exposed to surface water were identified in the BHHRA.

There is potential for adverse effects to fish and benthic invertebrates in the western portion of the Former Mill Tailrace from surface water exposures of barium, copper, lead, manganese, vanadium, benzo(a)anthracene and benzo(a)pyrene as indicated by exceedances of ecological surface water benchmarks; however, fish tissue data, sediment toxicity data, and bioaccumulation testing suggest that these exceedences in surface water do not result in risk to fish or benthic invertebrates in the Former Mill Tailrace or Neponset River. Note that the BERA included the western portion of the Former Mill Tailrace as part of the Neponset River for the analysis of potential impacts to fish and benthic invertebrates. Outside of the Former Mill Tailrace, only barium concentrations in the Neponset River exceed ecological benchmarks. As described above, barium concentrations observed in the Neponset River and Former Mill Tailrace appear to be associated with background conditions. Further discussion of comparison to background is presented in Section 2, along with a comparison of surface water concentrations to ARARs.

1.4.4 Summary of Analytes in Sediment

Sediment samples were collected from the Neponset River, Former Mill Tailrace, Lewis Pond, and the floodplain of the Neponset River (including the Orlando Property)[10]. The RI also included collection of fish tissue samples, earthworm samples, and invertebrate samples exposed to Site sediment in these areas.

A general discussion of potential adverse ecological effects due to exposure to sediment and/or one or more of these biological media is presented here. The reader is referred to the BERA report for a discussion of the nature and extent, and the fate and transport of analytes in these media, and their relative contributions to ecological risk.

[9] In general, this RI Report did not present a comparison of concentrations of analytes in Site media to "background" conditions; however, in the case of surface water data, a "background" comparison is helpful to understand the contaminant concentrations in surface water upstream of the Site.

[10] The BHHRA and BERA consider floodplain sediment to be soil as opposed to sediment, due to the manner in which receptors are exposed to this matrix. However, the transport and fate of analytes in floodplain sediment is due to migration with surface water and sediment in the Neponset River; therefore, summary discussions related to floodplain sediment are presented in this Section as opposed to Section 1.4.1.

Elevated concentrations of metals, PAHs, and asbestos occur in sediment samples collected as part of the RI. In general, the highest concentrations of analytes were detected in sediment from the Former Mill Tailrace and Lewis Pond. However, elevated concentrations of analytes were also detected in sediment from the Neponset River, and Neponset River floodplain. In general, once these analytes entered the surface environment at the Site, they were likely transported to their current location with surface water and sediment migrating in the Neponset River. However, many of these analytes (particularly many metals) could be a result of background conditions rather than analytes sourced at the Site.

The only identified human health risk from exposure to sediment at the Site is from the presence of lead in floodplain sediment (soil) on Lot #33-257. Lead concentrations in soil on residential Lot #33-257 pose a potential hazard from direct contact with soil for both a current and future resident, and potential future construction worker. However, this estimate of hazard is based on just two soil samples collected on this lot. Additional delineation of lead on Lot #33-257 was proposed as part of the RI to improve the estimate of lead exposures; however, the property owner denied access.

Asbestos was detected at concentrations greater than 1% in the Former Mill Tailrace, Neponset River floodplain, Lot #33-257, and Lewis Pond as part of SHA's RI sampling activities in 2000 and 2001. Figure 21 depicts the distribution of asbestos in sediment samples collected during the RI[11].

There is potential ecological risk to terrestrial birds and/or small mammals from elevated concentrations of aluminum, cadmium, chromium, lead, selenium, vanadium, and zinc within the floodplain of the Neponset River (including the Orlando Property) in either sediment and/or biota. In addition, there is potential ecological risk to aquatic wildlife from elevated concentrations of aluminum, bis(2-ethylhexyl)phthalate, lead, nickel, and/or vanadium within the upper Former Mill Tailrace, Lewis Pond and the Neponset River in either sediment and/or biota. These potential ecological risks are compared to background risks (e.g., the potential risks in the soil/sediment or biota from reference areas) in Section 2.

2.0 REMEDIATION OBJECTIVES AND APPROACH

This section documents development of RAOs, General Response Actions, and volumes of contaminated media. Also presented are the factors that would be considered in assessing the need for remediation, the applicability of remedial technologies and process options, and the development and evaluation of remedial alternatives. COCs and PRGs are identified as part of the development of RAOs.

Remedial alternatives must comply with ARARs. While a brief discussion/definition of ARARs is presented in this section of the report, further discussion and screening of the alternatives relative to their compliance with ARARs is presented in Section 5.0 in the context of the development of remedial alternatives that will be subject to the nine evaluation criteria.

[11] Some of the asbestos samples collected during the RI and depicted on Figure 21were collected by USEPA's oversight contractor M&E. Refer to the notes of Figure 21 for further discussion of this matter.

2.1 Identification and Compilation of ARARs and TBCs

ARARs are environmental or public health requirements that are promulgated by the State or Federal Government and are determined to be legally applicable or relevant and appropriate to the chemicals/contaminants, remedial activities, or other actions/circumstances at a CERCLA site. CERCLA mandates compliance with applicable requirements, and requirements deemed relevant and appropriate by the USEPA for on-Site activities, unless a waiver can be justified. Substantive requirements need to be fulfilled, but administrative requirements (e.g., Federal, State, and local permits; reporting requirements, etc.) are not applicable to on-Site remedial activities. The two types of ARARs, “applicable” and “relevant and appropriate” requirements are defined below.

Applicable Requirements: The National Contingency Plan (NCP - Section 300.5) defines "applicable" requirements as "those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site."

Relevant and Appropriate Requirements: The NCP (Section 300.5) defines "relevant and appropriate" requirements as "those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site."

TBCs (standards and guidance "to be considered"): Non-promulgated guidance or advisories established by the State or Federal Government that are not legally enforceable or binding, but may be considered during development and evaluation of remedial alternatives.

The three categories of ARARs and TBCs are: chemical-specific, location-specific, and action-specific. These categories are described below. Further description of ARARs and TBCs relating to the specific remedial alternatives considered is presented in Section 5.0.

2.1.1 Chemical-Specific ARARs and TBCs

Chemical-specific ARARs and TBCs are typically health- or risk-based restrictions on the amount or concentration of a chemical that may remain in the environment. Chemical-specific ARARs and TBCs establish numerical clean-up standards for remedial actions. In general, chemical-specific requirements are set for a single chemical compound or a closely related group of chemical compounds. Typically, these standards do not account for the potential effects of multiple contaminants.

2.1.2 Location-Specific ARARs and TBCs

Location-specific ARARs place limitations or standards on the types of activities which can be performed, based on location in specific areas. In general, location-specific ARARs include regulations intended to limit or prevent harm to sensitive areas such as wetlands, floodplains, fragile ecosystems, areas of endangered species, and historically/culturally significant features.

2.1.3 Action-Specific ARARs and TBCs

Action-specific ARARs typically are activity- or technology-based regulations or restrictions on remedial actions or other activities related to mitigation of hazardous wastes. These action-specific requirements regulate the way in which an alternative is implemented. Action-specific ARARs may include: design and operating standards for facilities that treat, store or dispose of hazardous wastes; groundwater monitoring requirements; and closure standards for treatment, storage and disposal facilities.

2.1.4 Policy Considerations

Additional policy and guidance documents from the USEPA were reviewed and taken into account, as appropriate, as part of the development and assessment of remedial alternatives. These documents were not considered to be ARARs or TBCs for the Site. Documents considered in the preparation of this FS are listed in the bibliography of this report.

2.2 Development of RAOs

RAOs are goals established for different media for the purpose of protecting human and ecological receptors or to comply with ARARs. RAOs identify the environmental media and COCs, exposure pathways and potential receptors, and PRGs for each exposure pathway/receptor. These RAOs are used to develop a range of remedial alternatives intended to reduce receptor exposure to contaminated media.

The results of the BHHRA and BERA completed as part of the RI identified the media of concern for the Site. While the risk assessment did not consider soils in the AOC (since this area was addressed through the earlier CERCLA removal action), this report acknowledges that an assessment of risk to human health or the environment would indicate potential risk in the absence of the cap, fence, and deed restriction due to the presence of soils containing asbestos and other site-related COCs documented at the time the area was covered.

A risk assessment to evaluate risks from inhalation of asbestos in soil becoming airborne for a current and future resident, current trespasser, current and future site worker, and future construction worker was conducted by EPA (Appendix B-1). This risk assessment was based on data from activity-based sampling performed at the Site in an area previously determined to be at an asbestos level of <1% in soils (Appendix B-2). The risk assessment demonstrated that any asbestos in soil that may be present in air through activities such as raking or mowing did not pose an unacceptable risk under CERCLA.

At the remainder of the residential parcels, including Lots 33-130, 33-137, and 33-138, asbestos was not detected in soil at concentrations greater than the detection limit of 1%. Based on the activity-based sampling conducted, it was determined that exposures to airborne asbestos in these areas also did not pose unacceptable risks under CERCLA.

Contaminants contained in Site groundwater, surface water, soil, soil vapor, and sediment result in unacceptable risk levels for human health. While no actionable ecological risks were identified within the Former Mill Tailrace or in the Neponset River immediately downstream of the Tailrace, surface water COC concentrations exceed ARAR-based standards in this area. The development of RAOs is described further below.

2.2.1 Determination of Environmental Media and Contaminants of Concern that Necessitate Remedial Action

Based on the results of the BHHRA and BERA completed as part of the RI, an evaluation of the potential environmental media and COCs that require remedial action was performed. This evaluation included an assessment of potential exposure pathways and receptors that could reasonably be expected to be exposed to unacceptable levels of these COCs.

2.2.1.1 Actionable Human Health Risks

The following set of criteria was used to designate those potential human health risks that are further considered in the FS (i.e., are "actionable"):

1. Cumulative incremental lifetime cancer risks (ILCR) greater than 1E-4;
2. Cumulative target organ-specific hazard index (HI) greater than 1;
3. A greater than 5% probability of exceeding a blood lead (PBL) concentration benchmark of 10 micrograms per deciliter (μg/dL); and/or
4. Exposure to elevated pH in groundwater or surface water.

A summary of those potential human health risks by potential receptor that exceed these criteria is provided in Table 1. Based on the above criteria, COCs were identified that pose an ILCR greater than 1E-6 contributing to a cumulative ILCR of 1E-4; a non-cancer HI greater than 1 to a target organ-specific HI greater than 1; a PBL greater than 5%; an elevated pH in groundwater or surface water, and those groundwater analytes that exceed their respective USEPA MCLs.

In some circumstances, while a potential human health risk was calculated for a given receptor in a given area for a given media, it was determined that the risks would not be addressed as part of the remedial action(s) for the Site. In general, the rationale for exclusion of these potential risks from further consideration in the FS was based on:

- the relatively low level of risk predicted and the acknowledged uncertainty in the risk assessment process for certain exposure pathways (e.g., the home garden produce pathway);

- or that the potential risks from groundwater did not incorporate results from the September 2006 groundwater sampling round (the inclusion of which would generally lower risk levels to below actionable conditions).

Further discussion of the rationale for eliminating these potential risks from further consideration in the FS is provided in the right hand column of Table 1.

The remaining human health risks will necessitate evaluation of various remedial alternatives that address these risks. These risks will be the basis for the development of Remedial Action Objectives (RAOs). The table below summarizes the environmental media and human health COCs by area of the Site. These areas are depicted on Figure 22. The AOC was covered in a previous CERCLA removal action so it was not evaluated in the human health risk assessment.

Area of Site	Exposure Route	Medium	Human Health COC(s)
East of South Street (Inclusive of the Former Railroad and Lower Mill Pond) – Note that this area is the basis for the "SO" alternatives defined later in this document	Ingestion / Dermal Contact / Inhalation	Soil / Soil Vapor	trichloroethene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; arsenic; asbestos (see note 1 to this table)
On-Site Groundwater	Ingestion / Dermal Contact / Inhalation	Groundwater	benzene; ethylbenzene; methylene chloride; trichloroethene; 2-methylnaphthalene; naphthalene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; bis(2-ethylhexyl) phthalate; carbazole; 4-methylphenol; antimony; arsenic; chromium; lead; manganese; nickel; vanadium; zinc; pH
Former Mill Tailrace – SW	Dermal Contact	Surface Water	pH
Lewis Pond, Neponset River, Lot #33-360, Lot #33-257, Former Mill Tailrace - SSW	Inhalation; Ingestion for lot #33-257	Sediment / Soil	asbestos; lead (for lot 33-257)

Notes:

1) The COCs listed presume that the receptor is a future resident. An assessment of reasonably anticipated future uses is included in Appendix B in the context of development of PRGs. As presented in Appendix B-3, two sets of PRGs have been developed for this Site based on a current allowed use of the site (daycare age child), or more restricted industrial use (site worker).

These risks are further summarized in Table 1, along with general RAOs that address these risks.

2.2.1.2 Actionable Ecological Risks

Following standard approaches used for ecological risk assessments completed under CERCLA, the BERA evaluated baseline potential ecological risk. The BERA did not draw conclusions about whether COPECs are present in the environment because of Site-related activities, or whether they represent a background condition unrelated to the Site. Additionally, the BERA did not draw conclusions about whether chemicals are elevated in the environment over concentrations that may be expected to be naturally occurring, or whether a potential adverse effect is of sufficient magnitude to warrant remedial action. These matters of perspective are further discussed below.

The BERA describes potential ecological risks at the Site and ranks these risks in terms of confidence levels associated with this assessment of potential risk. The BERA describes low, moderate, and high confidence levels associated with potential risks at the Site.

Potential risks with low levels of confidence (e.g., those potential risks that had hazard quotients for the Central Tendency Exposure [CTE] and Reasonable Maximum Exposure [RME] cases above one based on comparison to the No Observed Adverse Effects Level [NOAEL] or No Observed Effects Dose [NOED], but less than or equal to one based on comparison to the Lowest Observed Adverse Effects Level [LOAEL] or Lowest Observed Effects Dose [LOED]) were determined *not to be* of great enough confidence or sufficient magnitude to warrant remedial action at the Site.

Potential risks with moderate and high levels of confidence were further evaluated as part of the FS and are summarized on Table 2.

Table 2 provides perspective to these potential risks with moderate or high confidence levels that was not provided in the BERA. In general, this additional perspective provides information related to one or more of the following:

- A comparison of concentrations that receptors are exposed to at the Site to concentrations that receptors are exposed to at background reference areas;

- A discussion of situations where potential ecological risk is overestimated due to the presence of aluminum; and

- An evaluation of those potential ecological risks where two or more lines-of-evidence suggest contradictory findings with respect to conclusions regarding risk.

In addition to these perspectives, Table 2 provides judgments as to whether these potential ecological risks warrant remedial action (e.g., actionable ecological risks). As presented on Table 2, none of the potential ecological risks have been deemed actionable; therefore, they will not be further considered in the FS.

Concentrations of several analytes[12] in surface water exceed their respective USEPA National Recommended Water Quality Criteria (NRWQC) for chronic freshwater exposure and/or Massachusetts Surface Water Quality Standards (MSWQSs) in the lower portion of the Former Mill Tailrace, including: aluminum, copper, lead and pH. Exceedences of the NRWQC/MSWQSs must be addressed in the analysis of alternatives because they are ARARs.

The table below summarizes those surface water analytes that exceed the NRWQC/MSWQSs, which have been identified as COCs.

Area of Site	Surface Water COCs
Former Mill Tailrace	aluminum; copper; lead; and pH[13]

2.2.2 Development of Preliminary Remediation Goals

Developing a range of PRGs is the first step in the identification of Site remediation goals. PRGs are chemical- and media-specific concentrations that are intended to be generally protective of human and ecological receptors. Remediation goals are identified based on the developed PRGs when the remedy for the Site is chosen. These remediation goals are intended to reflect acceptable levels of contaminants to be attained by the remedial action.

Several PRGs were developed for each COC based on protection of human health, and identified chemical-specific ARARs/TBCs. Tables 3A through 7 present the PRGs that were developed on a medium-by-medium basis for various risk ranges (where appropriate). The tables present a summary of COCs and a summary of the PRGs selected for the COCs.

[12] Comparison of metals concentrations to USEPA National Recommended Water Quality Criteria for chronic freshwater exposure and/or Massachusetts Surface Water Quality Standards includes only a comparison of dissolved metals concentrations (not total metals concentrations) in surface water samples collected during the RI. These criteria and standards are based on dissolved concentrations.

[13] The surface water concentration of dissolved iron in the sample collected on August 1, 2001 at location SW-5 (1,280 ug/L) exceeded the NRWQC/MSWQS for iron of 1,000 ug/L. However, this result is questionable because the total iron concentration in this same sample was 555 ug/L. Typically, total metals concentrations are greater than dissolved metals concentrations because total metals analysis includes an assessment of both dissolved and total metal concentrations. Further, dissolved iron concentrations in samples collected at the SW-5 location in April 4, 2001 and September 29, 2006 were 117 and 320, respectively suggesting that dissolved iron concentrations at this location are likely below 1,000 ug/L (the NRWQC/MSWQS for iron). Therefore, iron is not considered a COC for surface water.

Appendix B-3 summarizes development of human health risk based PRGs (HHPRGs), which are presented in these tables.

As presented in Tables 3A and 3B, two sets of COCs and PRGs were developed for soils located East of South Street. COCs that require PRGs from the East of South Street Area are arsenic, TCE, and a subset of the carcinogenic PAHs (cPAHs – see Table 3A). Currently, this area of the Site is within the Town of Walpole's Limited Manufacturing (LM) zoning district, which permits both industrial and limited uses by children (but not residential use).

In 2005, the Town of Walpole developed a report entitled: "Reuse and Redevelopment Planning Alternatives". The report recommended that the Town in the future consider acquiring some of the on-facility properties and designate them for municipal uses, commercial offices/light industrial uses, or age-restricted housing.

Therefore, current and possible future exposure scenarios include the Site worker, construction worker, and trespasser, as well as a municipal or commercial worker, groundskeepers engaged in landscaping activities, and children attending libraries, schools, and daycare facilities. The second set of COCs and PRGs were developed assuming changes in the allowed uses to preclude uses by children. Precluding daycare exposure, the current and possible future exposure scenarios include Site worker, construction worker, and trespasser.

Concentrations of lead detected in soil have been high enough to consider the possibility of the soil being considered characteristic hazardous waste. Design studies will determine if TCLP standards are exceeded.

Unrestricted future residential use is not considered to be a reasonably anticipated future use in the LM zoning district. PRGs could be calculated for a variety of these current and possible future exposure scenarios, but to simplify the calculations, one adult exposure scenario was selected and one child exposure scenario was selected: the current allowed use (future young child attending daycare) and more restricted site use (current/future site worker).

In order to allow for future flexibility in the selection of a remedy at this Site in the event the Town of Walpole changes the allowed uses in the LM zoning district, two sets of PRGs have been developed for soils in the East of South Street Area. Accordingly, remedial alternatives evaluated for this portion of the Site will also consider these two potential redevelopment alternatives. Refer to Appendix B for further discussion of this matter.

The AOC was covered under the previous CERCLA removal action and was not evaluated in the risk assessment. The AOC is known to contain asbestos in soils above the cleanup level used in the Removal Action (1%). Therefore, a PRG has been developed for asbestos in this area consistent with the rest of the Site. Furthermore, a PRG has been developed for pH based on the RCRA standard for corrosivity.

The following tables summarize the PRGs that will be the remediation goals for remedial alternatives considered in this FS:

- **Table 3B:** Soil PRGs for the East of South Street Area and Lot #33-257;
- **Table 4B:** Groundwater PRGs;
- **Table 5:** Sediment PRGs;
- **Table 6B:** Surface Water PRGs; and
- **Table 7**: AOC Soil PRGs.

PRGs were not developed for soil vapor as the presence of contamination in soil vapor is directly attributed to soil contamination. Hence, remedial alternatives will focus primarily on soil contamination and/or preventing soil vapor from migrating to indoor air.

2.2.3 Establishment of Remedial Action Objectives and General Response Actions

As described above, RAOs are goals established for different media for the purpose of protecting human and ecological receptors and complying with ARARs. General response actions are actions that may be performed for a given medium in order to attempt to address the Site's RAOs. Table 8 describes the RAOs for groundwater/surface water, soil, sediment, and soil vapor, and the general response actions for each of these RAOs. These general response actions will be further developed into associated remedial technologies and process options in Section 3 of this report.

2.3 Areas and Volumes of Contaminated Media

As part of the FS, the areas/volumes/masses of media that will be the basis for further evaluation of remedial alternatives were estimated for groundwater, soil, and sediment. These areas/volumes/masses of groundwater, soil (including contaminated soils in the AOC and Settling Basin #2 Containment Cell), and sediment that require remediation were estimated based on the identified COCs and PRGs, potential exposure pathways, human and ecological receptors, the observed distribution of contamination, and potential future uses of the Site. Due to its nature, an estimate of the volume of contaminated surface water has not been included.

Given the uncertainty in some of the estimates of horizontal and vertical extent of contaminated media, uncertainty in average contaminant concentrations and contaminant masses, and complexities of contaminant occurrence, the contaminated media volumes/masses/concentrations discussed in this section should be considered approximations which are appropriate for initial planning-level purposes. However, design-phase investigations are recommended (and included in the remedial alternatives) to reduce the level of uncertainty in the extent and concentrations of contaminated media prior to final design, cost estimating, and implementation of remedial measures. Appendix C summarizes assumptions for the estimates provided in the following text.

2.3.1 Areas and Volumes of Contaminated Groundwater

The table below provides estimates for the volume of contaminated groundwater that has COC concentrations greater than PRGs. This area is depicted on Figure 23.

Groundwater Area Designation	COC(s) with Concentrations Higher than PRGs	Assumed Depth of Groundwater COCs greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (gallons)
On-Site Groundwater	benzene; ethylbenzene; methylene chloride; trichloroethene; 2-methylnaphthalene; naphthalene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; bis(2-ethylhexyl)phthalate; carbazole; 4-methylphenol; antimony; arsenic; chromium; lead; manganese; nickel; vanadium; zinc; pH	Variable. Refer to Appendix C for further discussion of this matter	170,000 for shallow 71,000 for deep 23,000 for bedrock	7,500,000

2.3.2 Areas and Volumes of Contaminated Soil

The table below summarizes the volumes of contaminated soils in the East of South Street (ESS) area that exceed PRGs. The table is keyed to Figure 24 and includes soil volume estimates for both the Site worker and daycare age child reuse scenarios[14] that will be used throughout this FS.

Summary of East of South Street Soil Volume Estimates

ESS Area Designation (applies to SO	COC(s) with Concentrations Higher than	Assumed Depth of Soil COCs greater than	Approximate Areal Extent (ft^2)	Approximate Volume Estimate

[14] While the soil TCE PRGs for a Site worker and daycare age child are different, they are not of significant enough difference to render different areal extent or volume estimates given the limited data in this portion of the Site. Therefore, for the purpose of this FS, it is assumed that the areal extent and volume of TCE-impacted soils requiring remediation under the Site worker and daycare age child are the same.

alternatives defined later)	PRGs	PRGs (ft)		(cubic yards)
ESS Area #1	TCE	6	1,700	400
ESS Area #2	Asbestos	4	400	60
ESS Area #3	Carcinogenic PAHs/Arsenic	1 to 2	67,000	2,700
(Including Deeper Areas)		Varies (2 to 9)	67,000	6,300
ESS Area #4	Carcinogenic PAHs	8	4,900	1,500

The table below summarizes the volumes of contaminated soils in the AOC Area. The table is keyed to Figure 25 and includes contaminated soils[15] located above the water table. As described above, the PRG for soils in the AOC (including the Settling Basin #2 Containment Cell) is excavation of contaminated soils.

AOC Area Designation	Primary Remediation Driver	Assumed Depth of Excavation in this Area	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Soil Capped AOC	Soil	The shallower of the base of contaminated soil, or the groundwater table	93,000	35,000
Asphalt Capped AOC	Soil	The shallower of the base of contaminated soil, or the groundwater table	19,000	2,500
Settling Basin #2 Containment Cell	Soil	The depth of the contaminated soil within the containment cell	14,000	1,500

[15] AOC soil volume estimates presented in this section do not include the "soil cap" (as it is assumed to that these soils are not contaminated) that is currently located on the AOC. It is estimated that approximately 6,600 cubic yards of "soil cap" are present on the AOC. Where excavation of the contaminated soils in the AOC is considered in this FS, the "soil cap" will be removed prior to excavation of underlying fill soils. Subsequent to excavation and confirmatory testing to ensure it meets regulatory standards for reuse, the "soil cap" will be reused as backfill material.

2.3.3 Areas and Volumes of Contaminated Sediment

The table below summarizes the volumes of contaminated sediment that exceed PRGs. The table is keyed to Figure 26.

Sediment Area Designation (applies to SSW alternatives defined later)	COC(s) with Concentrations Higher than PRGs	Assumed Depth of Sediment COCs greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Lewis Pond Area #1	Asbestos	2	22,000	1,700
Lewis Pond Area #2	Asbestos	2	15,000	1,200
Lewis Pond Area #3	Asbestos	2	9,400	700
Former Mill Tailrace	Asbestos	1	1,200	50
Lot #33-360	Asbestos	1	4,400	200
Lot #33-257	Asbestos/Lead	1	17,000	600

Prior to initiating remedial action of asbestos-impacted sediments, further assessment of the distribution of asbestos should be conducted in concert with further evaluation of appropriate asbestos sampling and analytical methods to determine if asbestos is present in sediment at concentrations that warrant remedial action.

3.0 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES AND PROCESS OPTIONS

In this section, remedial technology types and process options which are potentially applicable to the media, contaminants, locations, and conditions present at the Site are evaluated in a two-step process consisting of initial identification and screening, followed by a more detailed evaluation. The overall purpose of this evaluation is to develop a focused group of technologies and process options that can be used to assemble and formulate Site-wide remedial alternatives.

The term "technology types" refers to general categories of remedial technologies, such as capping or ex-situ physical treatment. The term "process options" refers to specific processes within each technology type. For example, the technology type referred to as "ex-situ physical treatment" for groundwater may include such process options as air stripping or adsorption.

3.1 Identification and Screening of Technologies and Process Options

The first step in the overall evaluation of remedial technologies is the identification and screening of the large array of available technologies and process options. The purpose of the screening effort is to reduce the number of available technology types and process options by eliminating those that are apparently not applicable to the Site, based primarily on technical implementability. This is accomplished by using information from the RI concerning contaminant types and concentrations, as well as Site characteristics, to screen out technologies and process options that cannot be effectively implemented at the Site.

For this identification and screening step, the Site media were organized into four broad categories consisting of groundwater/surface water, soil, sediment, and soil vapor. Tables 9A through 9D present a summary of the results from this initial screening along with rationale for retaining or eliminating remedial technologies or process options for further consideration in this FS.

3.2 Evaluation and Selection of Technologies and Process Options

In this step, the technologies and process options retained from the previous screening step are evaluated in greater detail to further focus the development of remedial alternatives. This step involves evaluating process options within the same technology type based on the criteria of effectiveness, implementability, and cost. The selected processes derived from this evaluation are then used to assemble Site-wide remedial alternatives as presented in Section 4.0[16].

In accordance with USEPA guidance (USEPA, 1988), brief descriptions of effectiveness, implementability, and relative cost, as they apply to the evaluation process, are provided below:

> Effectiveness - This criterion focuses on the potential effectiveness of process options in handling the estimated areas or volumes of media, and meeting the remediation goals; the potential impacts to human health and the environment during the construction and implementation phase; and how proven and reliable the process is with respect to the contaminants and conditions at the Site.
>
> Implementability - This criterion encompasses both the technical and administrative feasibility of implementing a process. Technical implementability was used in Section 3.1 as an initial screen of technology types and process options to eliminate those that are clearly ineffective or impractical at the Site. This subsequent, more detailed

[16]Some remedial alternatives/process options that have been retained following this screening of alternatives are not further considered in the development of remedial alternatives. These remedial alternatives/process options have been retained to allow for flexibility in the event that pre-design studies suggest that they may be more preferable than those that were considered further as part of the detailed analysis of alternatives. However, for costing purposes in the FS, they will not be further considered, as current knowledge of Site conditions suggests that other remedial alternatives/process options are more favorable. Where remedial alternatives/process options are retained but will not be further considered in the FS, a note to the "Retain / Eliminate" column has been added to address this matter.

evaluation of process options places greater emphasis on the institutional aspects of implementability.

Cost - This criterion plays a limited role in the screening of process options. Relative capital, and operation and maintenance (O&M) costs will be used rather than detailed estimates. The cost analysis will be based on engineering judgment, and each process will be evaluated as to whether costs are high, medium, or low relative to other processes in the same technology type.

Tables 10A through 10D present a summary of the results from this further screening of alternatives on the basis of effectiveness, implementability, and cost. A summary of whether an alternative was retained or eliminated, and the rationale for this decision, is provided in these tables.

4.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

This section presents the formulation and description of a range of Site-wide remedial action alternatives. In assembling alternatives, general response actions and process options retained from Section 3.0 are combined to form alternatives for the Site as a whole. The alternatives described in this section represent various conceptual approaches to addressing Site contaminants, which are technically effective, implementable, and cost-effective. These alternatives are subject to detailed analysis in Section 5.0. Tables 11A through 11D summarize the assembled alternatives by area of the Site. In some instances, these remedial areas overlap because they were compiled to address RAOs on a matrix-by-matrix basis. These areas are depicted on Figure 22 and include:

- The On-Site Groundwater and Former Mill Tailrace Remediation Surface Water Area (SW) - Groundwater and Surface Water;
- The East of South Street Remediation Area (SO) – Soil;
- The Area of Containment Remediation Area (AOC)– Soil; and
- Lewis Pond/Neponset River, Lot 33-360/Neponset River, Lot 33-257/Former Mill Tailrace Remediation Area (SSW) – Sediment / Soil.

In some instances, remedial alternatives may contain duplicative process options (e.g., maintenance of fencing in the AOC for both the groundwater and contaminated soil remedies, or preparation of deed restrictions for the Site) because it is not known which alternative will be selected as a final remedy.

Tables 12A through 12D present an analysis of potentially applicable ARARs/TBCs for each remedial alternative.

Tables 3B, 4B, 5, 6B, and 7 present a summary of PRGs for each matrix that are protective of human health and/or meet ARARs.

Several of the active remedial alternatives presented in this Section contemplate remediation within a wetland or floodplain. Those active remedial alternatives that involve significant activities/impact to wetlands and floodplains contain provisions to address these considerations (e.g., wetlands restoration or replacement).

The table below summarizes the zoning for each area of the Site requiring remediation:

Area Requiring Remediation	Current Zoning
The On-Site Groundwater and Former Mill Tailrace Surface Water Remediation Area (SW)	Limited Manufacturing / Residential
East of South Street Remediation Area (SO)	Limited Manufacturing
Area of Containment Remediation Area (AOC)	Limited Manufacturing; however, a deed restriction currently precludes development on, or disturbance of the AOC
Lewis Pond/Neponset River, Lot 33-360/Neponset River, Lot 33-257/Former Mill Tailrace Remediation Area (SSW)	Residential

As discussed in Section 2, currently the East of South Street Area is located within Walpole's Limited Manufacturing (LM) zoning district[17]; which permits both industrial and limited uses by children (but not residential use); therefore, current and possible future exposure scenarios include the Site worker, construction worker, and trespasser, as well as a municipal or commercial worker, groundskeepers engaged in landscaping activities, and children attending libraries, schools, and daycare facilities.

The Town of Walpole may in the future consider precluding redevelopment of the LM-zoned portions of the Site for use as a daycare facility or school. Therefore, in order to allow for future flexibility in the selection of a remedy at this Site, a second set of PRGs were developed assuming the Town changed the allowed uses in the LM zoning district to preclude uses by children. With such a restriction, the current and possible future exposure scenarios include Site worker, construction worker, and trespasser. Accordingly, remedial alternatives evaluated for this portion of the Site will also consider these two potential redevelopment alternatives.

4.1 Description of Groundwater and Surface Water Remedial Alternatives (SW Alternatives)

As presented on Table 8, RAOs for groundwater and surface water in the SW area include:

- Prevent ingestion/dermal contact/inhalation by a future resident with groundwater used as a domestic water supply having COC concentrations that exceed Maximum Contaminant Levels (MCLs) or result in a cumulative excess cancer risk greater than 1E-4, non-carcinogenic HI greater than 1, a PBL greater than 5%, or where pH conditions are elevated, and meet ARARs;

[17] While a portion of lot 33-121 is located within Walpole's Residential zoning district, its size, configuration, and limited access make future residential use unlikely. Therefore, residential use is not a reasonably foreseeable future use in this portion of the Site.

- Prevent migration of contaminated groundwater beyond the compliance boundaries for the SO and AOC waste management areas.
- Prevent dermal contact by a future construction worker with groundwater having elevated pH conditions, and meet ARARs;
- Prevent dermal contact by a current and future wader with surface water having elevated pH conditions, and meet ARARs; and
- Surface water concentrations shall meet ARARs.

The recommended groundwater PRGs are listed on Table 4B.

As described in the RI Addendum Report, the spatial distribution and concentrations of groundwater COCs appear to be at "steady state" (i.e., concentrations are relatively consistent with respect to time), or are decreasing. Groundwater from the area of the AOC discharges to the Former Mill Tailrace and the nearby Neponset River. Groundwater with elevated COC concentrations does not apparently migrate south or west of the Neponset River.

As summarized in Section 2.2.1.2, concentrations of surface water COCs exceed their respective PRGs in the Former Mill Tailrace. As described above, the Former Mill Tailrace appears to be a key discharge zone for contaminated Site groundwater. Hence, remedial alternatives considered below include preventing exposure to surface water in the Former Mill Tailrace by a future human receptor, or intercepting the discharge of contaminated groundwater to the Former Mill Tailrace which is causing COCs to exceed their respective PRGs.

The SW Alternatives developed for this FS are designated as:

SW-1: No Action;
SW-2: Limited Action; and
SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater.

Descriptions of these SW alternatives are provided in the following sub-sections.

4.1.1 Alternative SW-1: No Action

Alternative SW-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP. This alternative is proposed as a means of identifying problems posed by the Site if no remedial actions are implemented. "No Action," as used in this FS, means no additional actions to maintain or improve current conditions at the Site or to limit human or ecological exposure to Site contaminants, except for statutorily required Five-Year Reviews of the protectiveness of the remedy. Because no remedial measures would be implemented as part of this alternative, the only costs associated with SW-1 are the costs to conduct Five-Year Reviews (see Table 13A).

4.1.2 Alternative SW-2: Limited Action

Alternative SW-2, the Limited Action alternative, consists of measures, generally institutional controls and access restrictions, to protect human health. This alternative does not involve active treatment of groundwater or surface water. An itemized cost estimate for the SW-2 alternative is presented in Appendix D-1a. A summary of costs for this alternative is presented in Table 13A.

The SW-2 alternative includes establishing a compliance boundary around the SO and AOC waste management areas (see Figure 27A), within which deed restrictions would prevent use/exposure to contaminated groundwater. In addition, for the area around the Mill Tailrace, the alternative implements deed restrictions that would require a soil/groundwater management plan for potential construction-related activities within this area.

In addition, this alternative would include installing a fence around the Former Mill Tailrace to preclude access to a wader or fisher in this portion of the Site. This alternative also includes maintaining and repairing the newly constructed fence surrounding the Former Mill Tailrace. For costing purposes, it is assumed that approximately 10% of the fence would be replaced every 5 years.

Annual groundwater and surface water monitoring at approximately 22 monitoring well locations and five surface water locations established during the RI is also a proposed component of this alternative. Those monitoring wells and surface water locations were selected to provide general horizontal and vertical coverage of the site, and meet one or more of the following criteria:

- The surface water monitoring points are considered points of compliance for contaminated groundwater to reach surface water. Surface water COC concentrations at these locations are required to meet surface water PRGs listed in Table 6B.

- Groundwater monitoring points are currently located in a source area of contaminated groundwater within the SO and AOC waste management areas. Groundwater samples would be collected from these wells to assess if the groundwater contaminant plume remains at “steady state” or shows improving conditions.

- Monitoring points located downgradient or sidegradient of the compliance boundary of the SO and AOC waste management areas are to be used to confirm that contaminated groundwater is not migrating beyond the compliance boundary. Groundwater samples collected from these wells would be used to confirm that groundwater meets federal and state drinking water standards outside of the compliance boundaries of the SO and AOC waste management areas.

- The monitoring point is considered a “background” location to provide an assessment of groundwater/surface water conditions upgradient of the groundwater contaminant source area(s).

Those monitoring wells and surface water sample locations that are included in the proposed groundwater and surface water monitoring program are listed in the table below. Each location will be reviewed during pre-design efforts to determine if screen depths are appropriate to properly monitor the migration of any contaminants.

Sample Collection Location	Points of Compliance Monitoring Location	Source Area Monitoring Location	Down- or Side-Gradient of Compliance Boundary Monitoring Location	Background Monitoring Location
SHALLOW MONITORING WELLS				
SH-01S		X		
SH-05S			X	
SH-11S			X	
SH-14S			X	
SH-23S				X
SH-24S	X			
SH-25S			X	
SH-27S	X			
SH-28S	X			
WP-03			X	
DEEP MONITORING WELLS				
SH-01D		X		
SH-17D			X	
SH-19D				X
SH-25D			X	
SH-27D	X			
SH-28D	X			
BEDROCK MONITORING WELLS				
SH-01R		X		
SH-17R		X		
SH-19R				X
SH-24 R	X			
SH-27R	X			
SH-28R	X			
SURFACE WATER SAMPLE LOCATIONS				
SW-102				X
SW-103	X			
SW-105	X			
SW-107	X			
SW-108	X			

Groundwater and surface water samples would be collected in a manner consistent with previous groundwater and surface water sampling rounds conducted during the RI. Groundwater and surface water samples would be analyzed to assess compliance with the groundwater or surface water PRGs listed in Tables 4B and 6B, respectively.

In addition to collection of groundwater and surface water samples, groundwater and surface water elevations will be measured at all monitoring wells and surface water staff gauge locations installed during the RI (e.g., 65 monitoring wells and well points, and 13 surface water staff gauges). The results from the groundwater and surface water sampling and analysis, and the elevation measurements would be summarized in a monitoring report, which would be submitted to federal and state regulators annually.

Maintenance and repair of monitoring wells, such as repair of damaged well caps or concrete surface seals are included in this alternative. For costing purposes, it is assumed that two concrete surface seals and well caps would be replaced per year. It is also assumed that wells would occasionally become unusable and would require periodic replacement. For costing purposes, it is assumed that two, 50 ft-deep monitoring wells would be abandoned and replaced every five years in a manner consistent with RI monitoring well installation procedures. In addition, it is assumed that the location of staff gauges and monitoring wells would occasionally need to be resurveyed. For costing purposes, it is assumed that one day of surveying would be required every 5 years.

Quarterly Site inspections would be performed to verify the integrity of the newly installed fencing surrounding the Former Mill Tailrace, and hence limit potential human health risks due to exposure to high pH surface water. In addition, yearly monitoring and reporting of compliance with institutional controls and Five Year Reviews of site conditions and risks are included in this alternative. The Five-Year Reviews are a statutory requirement of CERCLA that apply to remedial actions in which contaminants remain on-Site.

Site groundwater conditions would likely remain relatively unchanged, except for changes brought about by naturally occurring processes (e.g., natural attenuation). Concentrations of groundwater and surface water COCs are expected to exceed PRGs within the groundwater compliance boundary for the SO and AOC waste management areas for greater than 100 years (refer to Section 6.2.1.3 of the RI Report for a discussion of the persistence of the groundwater pH plume).

4.1.3 Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater

As indicated above and described in further detail in the RI Report and RI Addendum Report, surface water COC concentrations in the Former Mill Tailrace are elevated due to the discharge of contaminated groundwater to this area of the Site. The SW-3 alternative includes measures to manage the migration of groundwater that under ambient conditions would normally discharge to the surface water of the Neponset River and, in particular, the Former Mill Tailrace. Collected groundwater would be treated on-Site in an ex-situ groundwater treatment system. Treated groundwater would be discharged to the Former Mill Tailrace.

Alternative SW-3 includes all of the measures proposed under the SW-2 alternative (e.g., establishment of a compliance boundary around the SO and AOC waste management areas, quarterly inspections, institutional controls to prevent use and exposure to contaminated groundwater, institutional controls to prevent exposure to contaminated soil and surface water around the Mill Tailrace, yearly compliance monitoring, long-term groundwater monitoring and five-year reviews, etc. - however, this alternative does not include construction of a fence), in addition to those further described below.

This section describes the conceptual approach and assumptions associated with groundwater collection and treatment to manage the migration of contaminated groundwater to surface water in the Former Mill Tailrace. The groundwater treatment system conceptual design was based on treatment equipment vendor information, design parameters reported in the literature, and professional experience. An itemized cost estimate, as well as supporting calculations and assumptions for alternative SW-3 are presented in Appendix D-1b. A summary of these costs are presented in Table 13A.

4.1.3.1 Pre-Design Investigations

Pre-design investigations focused on saturated zone hydrogeologic properties and groundwater treatability would be necessary to design the groundwater collection and treatment system contemplated as part of this alternative. Saturated zone pumping test(s) would be implemented to obtain data (e.g., hydraulic conductivity, specific yield, specific capacity, extent of groundwater capture) relevant to selection of extraction well or trench design parameters, such as the number of wells/trenches, their locations/depths, and the pumping rates necessary to achieve the RAOs of this remedial alternative. Groundwater treatability testing would be conducted concurrent with saturated zone testing to characterize extracted groundwater quality, evaluate the effectiveness of the proposed treatment processes, and assist in the final selection and sizing of treatment equipment. While discharge of treated groundwater to surface water in the Former Mill Tailrace is the discharge option proposed in the SW-3 alternative, further review, and potentially pilot testing, would be necessary to determine if other discharge options were more preferable (e.g., injection/infiltration of treated groundwater into the subsurface).

4.1.3.2 Conceptual Design of Groundwater Collection and Treatment

The proposed conceptual design of the groundwater collection and treatment system would consist of the following principal subsystems:

- Groundwater extraction system;
- Groundwater treatment system; and
- Treated groundwater discharge system.

Each of these components is discussed below. In addition, assumptions for operations and maintenance costs associated with the proposed groundwater treatment system are also discussed below.

Groundwater Extraction System

Capture of the plume of contaminated groundwater that discharges to the Former Mill Tailrace under ambient conditions could be accomplished by two hypothetical alternatives, a recovery well(s), and an interceptor trench(s).

Groundwater collection efforts are focused on the vicinity of the western boundary of the AOC near monitoring well SH-05S. This location is suggested for the following reasons (refer to the RI Report for further discussion of the hydrogeologic properties of the saturated zone in this area of the Site and the occurrence, transport and fate of groundwater contaminants in this area of the Site):

- Vertical hydraulic gradients are upward in this area of the Site (i.e., groundwater is traveling from deeper portions of the subsurface to shallower portions of the subsurface);

- Elevated concentrations of groundwater contaminants are located primarily within the shallow saturated zone (ice contact sand/sand and gravel unit) in this portion of the Site, which in turn means that groundwater collection efforts could be focused on capturing shallow groundwater only; and

- The depths to groundwater in this portion of the Site are relatively shallow (e.g., generally less than 5 feet below ground surface), which means that the depth of the well(s) and/or trench(es) in this area of the site could be relatively shallow (e.g., less than approximately 15 ft bgs).

Either a groundwater recovery well(s) or an interceptor trench(es) could be used to capture groundwater in this area of the Site. A groundwater interceptor trench is suggested as the preferred groundwater collection measure for FS remedial alternative costing purposes for the reasons provided below. As discussed below, the actual means of extraction should be evaluated during final design of the extraction system if this alternative is selected as a final remedy.

- An interceptor trench would more readily provide capture of contaminated groundwater in the case of the ice contact sand/sand and gravel unit where saturated zone transmissivity is limited, and particularly, as in this case, where the saturated thickness may be a key limiting factor.

- An interceptor trench may be more readily constructed to limit “dilution” of the recovered groundwater and limit the attendant flow rate to the treatment system, in consideration of the close proximity of the Neponset River to the proposed groundwater extraction location. Two flow-limiting methods are included in the conceptual trench design: 1) a flow barrier,

such as an HDPE liner, added to the downgradient sidewall of the trench, and 2) a flow barrier extended from the southerly trench terminus to the edge of the aluminum culvert that contains the Neponset River in the AOC[18].

In light of the above, alternative SW-3 contemplates installation of a 200-ft long groundwater interceptor trench at the approximate location depicted on Figure 27A. The trench would be installed such that it penetrates the entire thickness of the ice contact sand/sand and gravel unit, such that it is keyed into the glacial till unit. For costing purposes, a trench depth of approximately 15 ft was assumed to be adequate to accomplish full penetration of the ice contact sand/sand and gravel unit in this portion of the Site. As noted above, an HDPE flow barrier would be installed along the downgradient wall of the trench. The flow barrier would extend from the southern terminus of the trench to the culvert[19] that contains the Neponset River through the AOC. It is assumed that the flow barrier extending south from the collection trench would be constructed of sheet piling.

A preliminary schematic of the basic aspects of the design of the trench is presented on Figure 27B. In general, a typical groundwater extraction trench would be constructed by common excavation techniques. Earthmoving equipment with sufficient reach would be used to excavate a trench of sufficient depth and width to allow construction of the groundwater collection piping at the bottom of the trench. Stabilization of the trench walls during excavation would be typically achieved using either shoring, such as trench boxes, or slurry-stabilized excavation. The selection of trench stabilization is dependent on the final design of the trench and would be selected during the final design process. For cost purposes, it is assumed that the trench would be constructed using standard shoring techniques, which would be more likely in this case where the excavation depth is limited.

Following excavation to design grade and stabilization of the trench walls, a perforated drainage pipe would be installed in the bottom of the trench excavation. The drainage pipe would be pitched to drain towards a pump chamber. With the drainage pipe and the low permeability barrier noted above in place, the trench would be backfilled with a material with a higher hydraulic conductivity than the surrounding existing material, such as pea gravel wrapped in filter fabric. The relatively higher permeability of the trench backfill would provide a preferential groundwater flow path down to the drainage pipe while the system is operating. Above the seasonal high water elevation, the trench backfill would consist of a lower permeability material to limit the infiltration of rainwater into the trench, which would dilute the extracted groundwater and increase treatment costs. The ground surface above the trench would be graded to direct surface drainage away from the trench to also help reduce direct infiltration.

[18] For the purpose of this FS, it is assumed that the aluminum culvert that contains the Neponset River in the AOC will remain on-Site. If the culvert is removed as a component of the final remedial measures implemented for the AOC area of the Site, further evaluation of the placement of the trench would be necessary as part of the pre-design investigations.

[19] Construction of the aluminum culvert during the 1992 Removal Action included placement of granular, permeable soils surrounding the aluminum culvert. Therefore, "keying" the trench into the culvert may include measures to limit groundwater flow to the trench from the presumably permeable soils surrounding the culvert. The "keying" the trench into the culvert would be further evaluated as part of pre-design studies.

The pump chamber would be situated at the lowest point of the extraction trench. An extraction pump would be installed in the chamber to pump fluids entering the trench to the influent tank of the groundwater treatment system. While operating, the pump would draw the liquid level in the chamber down sufficiently to induce a lateral flow of groundwater through the perforated drainage pipe in the trench into the chamber.

Final design of the groundwater extraction system, including further analysis of the groundwater collection method, location of the trench (or well), trench (or well) construction, and extraction rates should be based on the results of pre-design investigations. Especially in this case, the proximity of the surface water to the proposed extraction trench, along with the complicated geometry of the surface water bodies, the heterogeneity of the soil deposits in this area, and the introduction of a downgradient flow-limiting barrier in the design of the interceptor trench, support an "observational" approach to final design of this alternative, inclusive of pilot testing.

The preliminary assessment of potential groundwater flow rate into the trench ranges from 1 to 7 gallons per minute (gpm)[20]. For costing purposes, it was conservatively assumed that groundwater would be removed from the trench at a flow rate of approximately 10 gpm. As described above, pre-design investigations focused on assessing capture methods and potential extraction rates would be a necessary component of this alternative.

Groundwater would be pumped underground to an on-Site, ex-situ groundwater treatment system, which would be located inside a newly constructed building near the current location of the Settling Basin #2 Containment Cell (see Figure 27A).

Groundwater Treatment System

The purpose of the groundwater treatment system would be to reduce contaminant concentrations in the extracted groundwater to allow discharge to the Former Mill Tailrace. Surface water discharge limits may be lower than groundwater PRGs. The presumed chemical characteristics of the influent groundwater are summarized in Appendix C-2[21]. In addition, Appendix C-2 summarizes the requisite surface water discharge limits.

In general, groundwater treatment would consist of:

- pH adjustment to reduce the pH of influent groundwater;

[20] Section 6.2.13 of the RI Report summarizes a groundwater discharge of approximately 7 gpm through an area of the Site at a location in near proximity to the proposed extraction trench. Further, an assessment of a "steady-state" pumping rate analysis of a potential extraction well located in this area yields an estimated extraction rate with a pumping well of approximately 1.3 to 5.6 gpm.

[21] Refer to Appendix C-2 for a description of the assumptions for the chemical characteristics of influent groundwater.

- Greensand filtration to reduce some metals concentrations (e.g., iron) in order to prolong ion exchange resin life;

- Liquid granular activated carbon filtration to reduce VOC and SVOC concentrations; and

- Ion exchange resin treatment to reduce metals concentrations.

In addition, backwash and filter press mechanisms are proposed to prolong filter media/resin life and/or to dewater sludge to reduce volumes of groundwater treatment wastes. A process flow diagram with further description of the proposed groundwater treatment system is presented on Figure 27C.

The groundwater treatment system would require periodic operator attention and maintenance. Typical operations for the system would include:

- Routine water sampling to monitor system performance and to monitor for compliance with the surface water discharge standards;

- Monitoring the performance of the greensand system automatic backwash, and removal of accumulated backwash sediments from the backwash receiving tank. Backwash sediments would be pumped through the system filter press, where they can be consolidated and partially dried prior to disposal;

- Replacement of chemical feed solutions for the system including pH adjustment chemicals and potassium permanganate solution for the greensand filters;

- Change out of activated carbon and/or ion exchange resin treatment units with fresh media, when the media in the on-line unit is exhausted; and

- Routine maintenance of pumps, compressors, instrumentation, piping and other system components as necessary.

Groundwater Discharge System

Treated groundwater would flow via gravity in underground piping to the ground surface in the vicinity of the Former Mill Tailrace. A schematic of the proposed outfall for treated groundwater is presented on Figure 27D.

4.1.3.3 Clean-up Time Frame

As described above, while groundwater would be the media that would undergo treatment in the SW-3 alternative, it would be collected and treated for the purpose of protecting surface water in the Former Mill Tailrace. The design of the trench assumes a relatively low flow ("quasi-passive") groundwater collection system (i.e., groundwater would be withdrawn from

the trench at a rate approximately equal to that of the ambient groundwater discharge through the cross sectional area of the trench). Hence, the trench serves primarily as a containment measure to intercept groundwater before reaching its primary discharge location in the Former Mill Tailrace. The groundwater collection, treatment, and discharge system is not intended to act as, and would not be practicable as, a remedy for contaminated groundwater beneath the AOC.

The time to achieve surface water PRGs in the Former Mill Tailrace would be a function of two factors: 1) the time required for attenuation of groundwater contaminants between the extraction trench and the Former Mill Tailrace; and 2) the time required for displacement and dilution of surface water in the Former Mill Tailrace by clean water discharged from the treatment system. Of the two factors, displacement and dilution with clean discharge water is anticipated to produce the greatest positive impact in the shortest time. The following are key considerations:

- It is anticipated that the downgradient flow barrier proposed for the trench would limit the potential for a reversal of the groundwater flow gradient in the area of the Former Mill Tailrace. It is anticipated that in turn, this would limit the potential that surface water within the Former Mill Tailrace would flow to the trench. Nevertheless, it is likely that the operation of the trench would at least reduce the hydraulic gradient such that if a positive flow gradient toward the Former Mill Tailrace is maintained, or occurs at least occasionally (e.g., following a precipitation event), it would only result in a small percentage of the groundwater discharge that is currently occurring.

- The rate of anticipated discharge of 10 gpm or 14,400 gallons per day, is high relative to the volume of contaminated surface water in the Former Mill Tailrace, which is estimated to be on the order of 8,400 gallons. Even with a high number of mixing volumes to effect dilution (up to 50), less than a month would be required to achieve surface water PRGs.

As noted above, the proximity of the surface water to the proposed extraction trench, along with the complicated geometry of the surface water bodies, the heterogeneity of the soil deposits in this area, and the introduction of a downgradient flow-limiting barrier in the design of the interceptor trench, support an "observational" approach to final design of this alternative, inclusive of pilot testing. Such testing would also be of great value in helping to better quantify timeframes for cleanup.

4.2 Description of East of South Street Remedial Alternatives (SO Alternatives)

The East of South Street Remedial Area is depicted on Figure 28A. The RAOs for soil and soil vapor in the East of South Street Remedial Area (SO) include:

- Prevent ingestion/dermal contact by a future resident with soil having COC concentrations which result in cumulative excess cancer risk > 1E-04 or non-carcinogenic HI > 1, and meet ARARs;

- Prevent inhalation of asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs; and
- Prevent inhalation of indoor air, impacted by contaminated soil vapor, having COC concentrations which result in a cumulative excess cancer risk >1E-04 or non-carcinogenic HI>1, and meet ARARs.

As presented on Table 3B, two sets of PRGs were developed for the SO remedial alternatives. Similarly, remedial alternatives presented in Table 11B contemplate two redevelopment scenarios: currently allowed use (future daycare child) and more restricted site use (future site worker). In addition, while RAOs address preventing inhalation of indoor air from contaminated soil vapor, PRGs are established only for soil as elevated concentrations of soil vapor COCs are presumed to be a direct result of elevated COC concentrations in soil.

The SO remedial alternatives for this FS are designated as:

SO-1: No Action;
SO-2: Limited Action;
SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos (exceeding the asbestos PRG) - Site Worker;
SO-4: Limited Excavation – Site Worker;
SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils – Daycare Child; and
SO-6: Comprehensive Excavation and Off-Site Disposal – Daycare Child.

Detailed descriptions of these SO alternatives are provided in the following sub-sections.

4.2.1 Alternative SO-1: No Action

Alternative SO-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP under Section 300.68. This alternative is proposed as a means of identifying the problems posed by the Site if no remedial actions are implemented to address soil or soil vapor contamination. "No Action" as used in this Section when referring to soil and soil vapor, means no measures are proposed to address soil and soil vapor contamination. Statutorily-required Five-Year Reviews of the protectiveness of the remedy would be conducted. Because no remedial measures would be implemented as part of this alternative, there are no costs associated with SO-1, except for the cost of Five-Year Reviews (see Table 13B).

4.2.2 Alternative SO-2: Limited Action

Alternative SO-2, the Limited Action alternative, consists of measures, generally institutional controls and access restrictions, to protect human health by limiting exposure to contaminants. This alternative is meant to be protective of site workers, but not future daycare child or school scenarios. This alternative does not involve active treatment/removal of contaminants. An

itemized cost estimate for alternative SO-2 is presented in Appendix D-2a. A summary of costs for this alternative is presented in Table 13B.

The SO-2 alternative includes establishing institutional controls to preclude development of the site for uses that include child-type exposures currently allowed under the Town of Walpole's zoning by-laws. This action involves preparation of a deed restriction for properties in this area of the Site. The deed restriction would include a description of permitted activities and uses, and a summary of activities and uses that are not permitted. Specifically, the deed restriction would preclude redevelopment of the Site for uses that result in exposures to children such as a daycare facility or school (the current allowed use). A component of this deed restriction would also include requirements of adhering to the guidelines of a groundwater and soil management plan (contaminated groundwater is addressed through the SW alternatives), which would be established for activities that could cause exposures to COCs, for instance from construction-related activities.

This alternative includes measures to maintain and repair the existing pavement in those areas where soil COC concentrations exceed their respective PRGs (e.g., the SO Area #1 and SO Area #2 - refer to Figure 28A). For costing purposes, it is assumed that approximately 5% of the pavement would be replaced every year. In addition, this alternative includes installing approximately 2,800 linear feet of fencing around the East of South Street Area. For costing purposes, it is assumed that a six-ft-high chain link fence with three strands of barbed wire would be the type of fence installed. It is also assumed that maintenance of the fence would include replacing approximately 10% every 5 years.

This alternative includes installation of four soil vapor implants in the vicinity of the SB-09 soil boring where elevated TCE concentrations in soil and soil vapor were observed, and collection of soil vapor samples from these implants on an annual basis. Soil vapor implant installation and sampling would be conducted in a manner consistent with previous soil vapor implant installation methods and sampling conducted at the Site. The results from the soil vapor sampling and analysis would be summarized in a monitoring report, which would be submitted to federal and state regulators annually.

Long-term maintenance of soil vapor implants, such as repair of damaged concrete surface seals, is included in this alternative, For costing purposes, it is assumed that 1 concrete surface seal would be replaced per year. In addition, it is assumed that soil vapor implants would occasionally become unusable and would require periodic replacement. For costing purposes, it is assumed that one soil vapor implant would be abandoned and replaced every five years.

Quarterly Site inspections would be performed to verify the integrity of asphalt and fencing. In addition, there would be yearly compliance monitoring and reporting on institutional controls. A review of Site conditions and risks would be performed at five-year intervals and these conditions would be documented in a report. This measure is a statutory requirement of CERCLA that applies to remedial actions in which contaminants remain on-Site.

Site soil and soil vapor conditions would likely remain relatively unchanged, except for changes brought about by naturally occurring processes (e.g., natural attenuation). A

calculation has not been attempted of the natural attenuation rate of TCE in soil and soil vapor as limited data are available for this type of assessment. However, for costing purposes, it is assumed that TCE concentrations in soil would exceed PRGs for approximately 30 years. Since degradation of asbestos is not expected, it is assumed that asbestos concentrations in soil would remain relatively unchanged for greater than 100 years.

During remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place. If so, the cover (or cap) over the remaining wastes will be designed to meet relevant and appropriate hazardous waste standards

4.2.3 Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos

Alternative SO-3 includes measures to protect human health by eliminating exposure to a future Site worker from TCE-contaminated indoor air, and to maintain the existing pavement in areas where asbestos concentrations in soil are greater than the asbestos PRG. This alternative is meant to be protective of site workers, but not future daycare child or school scenarios. Alternative SO-3 includes all of the measures proposed under SO-2 (except for installing and maintaining a fence and installing and maintaining an asphalt cap over TCE-impacted soil), in addition to those further described below. For brevity, the SO-2 remedial measures are not repeated in this section.

This section describes the conceptual approach and assumptions associated with installation of a horizontal barrier and sub-slab depressurization system for a hypothetical future building to mitigate potential indoor air risks from TCE-impacted soil vapor. Asbestos in soil is addressed by maintaining the asphalt over the asbestos-impacted soils in a manner consistent with the SO-2 alternative. An itemized cost estimate, and supporting calculations and assumptions for alternative SO-3 are presented in Appendix D-2b. A summary of costs for this alternative is presented in Table 13B.

The estimated area of TCE at concentrations in soil above PRGs is depicted on Figure 28A. For costing purposes for the vapor control system, it is assumed that the system would be sufficient for an approximately 5,000 ft^2 building The estimate only includes costs for the installation of a horizontal barrier and sub-slab depressurization system.

4.2.3.1 Pre-Design Investigations

Pre-design investigations focused on further delineating the extent of soils with TCE and asbestos concentrations greater than their respective PRGs would be necessary to appropriately design the remedial measures proposed as part of this alternative. For costing purposes, it was assumed that approximately 20 soil samples would be collected in the vicinity of soil boring SB-09 where elevated concentrations of TCE (the “TCE Hotspot”) have been identified. These soil samples would be submitted for laboratory analysis of VOCs. In addition, it is assumed that approximately 10 soil samples would be collected in the vicinity of M&E soil boring I-3.5 where elevated concentrations of asbestos (the “Asbestos Hotspot”) have been identified. These soil samples would be submitted for laboratory analysis of asbestos. For costing

purposes, it is assumed that soil samples would be collected in a manner consistent with soil samples collected during the RI.

In addition, pre-design investigations focused on determining placement and sizing of the subslab depressurization system would be conducted.

During remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place. If so, the cover (or cap) over the remaining wastes will be designed to meet relevant and appropriate hazardous waste standards

4.2.3.2 Conceptual Design of Horizontal Barrier and Subslab Depressurization System

As depicted on Figure 24, the area where TCE in soil exceeds PRGs is approximately 1,700 ft^2. In order to reduce vapor migration from contaminated soil and soil vapor it would be necessary to install a low permeability geomembrane beneath any building located in the area with TCE-impacted soils that is depicted on Figure 28A. For costing purposes, it is assumed that an impermeable geomembrane would be installed beneath a building with a footprint of approximately 5,000 ft^2 that is located over the entire area of TCE-impacted soil depicted on Figure 28A. A schematic of the construction of this geomembrane is provided in Figure 28B.

In addition, a sub-slab depressurization (SSD) system would be installed beneath the building to further limit the potential for vapor intrusion into the building. The purpose of the SSD system is to create a pressure differential across the building slab that favors movement of indoor air into the subsurface[22]. The SSD system would consist of a fan or blower, which draws soil gas from beneath the building via extraction points installed through the building slab. The extracted soil gas, including VOCs, is then collected in a series of pipes, which are manifolded together and exhausted to the atmosphere at a single point above the outdoor breathing zone.

4.2.3.3 Clean-up Timeframe

Operation of the sub-slab depressurization system would likely result in a faster clean-up of TCE-impacted soils relative to the 30 year clean-up timeframe estimated for natural breakdown of TCE in the SO-2 alternative, since removal of TCE mass would likely be accomplished by extraction of contaminated soil vapor from the subsurface via the SSD. However, limited data are available to predict this clean-up timeframe. Therefore, it is assumed that clean-up of TCE to soil PRGs would be accomplished in approximately 10 years. Since degradation of asbestos is not expected, it is assumed that asbestos concentrations in soil would remain relatively unchanged for greater than 100 years.

[22] ITRC (Interstate Technology & Regulatory Council). 2007. Vapor Intrusion Pathway: A Practical Guideline. VI-1. Washington, D.C.: Interstate Technology & Regulatory Council, Vapor Intrusion Team. www.itrcweb.org.

4.2.4 Alternative SO-4: Limited Excavation

Those areas where soil COC concentrations exceed their PRGs under the Site worker redevelopment scenario are the SO Area #1 (area with TCE-impacted soil) and SO Area #2 (area with asbestos-impacted soil), which are depicted on Figure 24. This alternative is meant to be protective of site workers, but not future daycare child or school scenarios. Alternative SO-4, the Limited Excavation alternative, includes excavation of soils that exceed Site worker PRGs. As depicted on Figure 28A, those areas that would be excavated are the TCE- and asbestos-impacted soils. Alternative SO-4 includes establishment of institutional controls that prohibit development of the site for child-intensive uses (the current allowed use), and requires compliance with a groundwater and soil management plan if the site is to be disturbed, as well as those measures further described below.

An itemized cost estimate, and supporting calculations and assumptions for Alternative SO-4 are presented in Appendix D-2c. A summary of costs for this alternative is presented in Table 13B.

As described in Section 2, it is estimated that approximately 400 cubic yards of soil exceed the TCE site worker soil PRG, and 60 cubic yards of soil have concentrations greater than or equal to the asbestos PRG. This alternative includes excavating these soils, collecting confirmatory samples to verify that soils with concentrations greater than PRGs have been removed, and backfilling these excavations with clean soil.

4.2.4.1 Pre-Design Investigations

Pre-design investigations focused on further delineating the extent of soils with TCE and asbestos concentrations greater than their respective PRGs would be necessary to appropriately design the remedial measures proposed as part of this alternative.

For costing purposes it is assumed that approximately 20 soil samples would be collected in the vicinity of soil boring SB-09 near the TCE Hotspot. These soil samples would be submitted for laboratory analysis of VOCs. In addition, it is assumed that approximately 10 soil samples would be collected in the vicinity of M&E soil boring I-3.5 near the Asbestos Hotspot. These soil samples would be submitted for laboratory analysis of asbestos. For costing purposes, it is assumed that soil samples would be collected in a manner consistent with soil samples collected during the RI. In addition, representative numbers of these soil samples would be submitted for appropriate laboratory analysis to provide waste characterization data that would be the basis for potential disposal options.

In the event that the results of waste characterization indicate that the soils would be deemed characteristically hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the soils non-hazardous on-Site. This would allow the disposal of this soil off-Site as non-hazardous waste if cost savings would be realized over disposing of it off-site as hazardous waste.

4.2.4.2 Excavation of Soils

Limited data are available pertaining to the RCRA hazardous waste characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of soils that would be excavated as part of the SO-4 alternative. Because of the relatively limited Site soil data pertaining to disposal characterization, assumptions were made regarding the volumes of soil associated with various disposal categories. In some cases, analytes present in soil that are not the target of the SO-4 remedial effort (e.g., lead and arsenic) have concentrations that could indicate these soils are characteristically hazardous. In general, commonly applied methods for conservatively estimating the potential hazardous characteristics of a material in the absence of TCLP data have been used. One rule of thumb is commonly called the "RCRA 20X Rule" and is a means of estimating if soils could be considered characteristically hazardous. Excavated soils would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the soils would be deemed hazardous, the soil would be mixed with suitable stabilization agent(s) (e.g., Portland cement) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste.

Refer to Appendix C for further discussion of categorization of excavated soil types and estimation of their volumes. The table below presents a description of the various soil types, the estimated volumes of these soil types (after excavation), assumptions regarding the potential for these excavated soils to be deemed characteristically hazardous waste, and whether stabilization to render them non-hazardous may be warranted (e.g., for a cost savings) prior to off-Site disposal.

Remedial Area	Soil Description	Potentially Hazardous Based on "20X Rule"?	Estimated Volume (Cubic Yards)	Stabilization Prior to Disposal?
TCE Hot Spot Near SB-09	Soil TCE greater than 10 ppm, and/or lead greater than 100 ppm	Yes	100	Yes
	Soil with TCE less than 10 ppm, and lead less than 100 ppm	No	300	No
Asbestos Hot Spot	Soil with Asbestos greater than the PRG and lead less than 100 ppm	No	30	No

Remedial Area	Soil Description	Potentially Hazardous Based on "20X Rule"?	Estimated Volume (Cubic Yards)	Stabilization Prior to Disposal?
	Soil with Asbestos greater than the PRG and lead greater than 100 ppm	Yes	30	Yes

Samples would also be collected from each excavation area to confirm removal of soils exceeding PRGs. Laboratory analysis would focus on TCE and/or asbestos, as appropriate for the remediation drivers in each excavation area. Subsequent to completing the excavation, clean fill soils would be placed and compacted in the excavations. Since the SO-4 remedial areas are currently paved, repaving these areas with like material is included subsequent to backfilling the excavations.

4.2.4.3 Clean-up Timeframe

It is estimated that the time necessary to complete the SO-4 alternative would be less than one month from initiation of excavation activities.

4.2.5 Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils

Those areas where soil COC concentrations exceed their PRGs under the currently allowed use scenario include ESS Area #1 (TCE-impacted soil), ESS Area #2 (asbestos-impacted soil), and ESS Areas #3 and #4 (PAH- and/or arsenic-impacted soil) and are depicted on Figure 24. Alternative SO-5, the Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils alternative, includes excavation of the same TCE- and asbestos-impacted soils that were removed in the SO-4 alternative and long-term monitoring. For brevity, the SO-4 excavation and off-Site disposal activities are not repeated herein. In addition, SO-5 includes excavation of PAH- and arsenic-impacted soils to depths of one ft bgs over most of the area and two ft bgs in the railroad right of way.

An itemized cost estimate, and supporting calculations and assumptions for alternative SO-5 are presented in Appendix D-2d. A summary of costs for this alternative is presented in Table 13B.

4.2.5.1 Pre-Design Investigations

Pre-design investigations focused on further delineating the extent of soil COCs that exceed their current allowed use PRGs would be necessary to appropriately design the remedial measures proposed as part of this alternative. For costing purposes, it is assumed that approximately 20 soil samples would be collected in the vicinity of soil boring SB-09 near the TCE Hotspot. These soil samples would be submitted for laboratory analysis of VOCs. It is

also assumed that approximately 10 soil samples would be collected in the vicinity of M&E soil boring I-3.5 near the Asbestos Hotspot. These soil samples would be submitted for laboratory analysis of asbestos. In addition, it is assumed that 1 sample would be collected from 0 to 1 ft bgs for every 400 ft^2 of area where PAH and/or arsenic concentrations greater than their respective PRGs are suspected. Based on an approximate area of soil with PAH and/or arsenic concentrations greater than their respective PRGs, it is estimated that approximately 134 soil samples would be collected and submitted for laboratory analysis for PAHs and/or arsenic. For costing purposes, it is assumed that soil samples would be collected in a manner consistent with soil samples collected during the RI. In addition, representative numbers of these soil samples would be submitted for appropriate laboratory analysis to provide waste characterization data that would be the basis for potential disposal options.

In the event that the results of waste characterization indicate that the soils would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the soils non-hazardous on-Site. This would allow their disposal off-Site as non-hazardous waste and allow for potential cost savings.

4.2.5.2 Excavation of Soils

As indicated above, soils excavated in the SO-4 alternative would also be excavated in the SO-5 alternative; therefore, for brevity, a summary of excavation of the TCE- and asbestos-impacted soils are not repeated herein.

Under the current allowed use scenario, it is assumed that a child is exposed only to the upper 1 foot of soil. Hence, removal of PAH- and arsenic-impacted soils that exceed daycare-age child PRGs would primarily entail only excavation of one foot of soil. Subsequent to completing the excavation, clean fill soils would be placed and compacted in the excavations. Where the excavation is completed in areas that are paved, repaving these areas with like material subsequent to backfilling the excavations would be included. Review of available data shows that in the unpaved area requiring excavation (the railroad right of way), evidence of deeper soil (> 2 ft bgs) contamination is not apparent. Therefore, it is more cost-effective to remove the soil in this area to 2 ft bgs and backfill with clean fill rather than covering remaining contaminated soils with a vegetated cap and maintaining it afterwards.

In addition to the confirmatory soil sampling described in the SO-4 alternative, soil samples would be collected from 0 to 1 ft bgs from around the perimeter of the PAH/arsenic-impacted soil excavation(s) to confirm that soils that exceed daycare-age child PRGs are removed.

Limited data are available pertaining to the RCRA hazardous characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of soils that would be excavated as part of the SO-5 alternative. Because of the relatively limited Site soil data pertaining to disposal characterization, assumptions have been made regarding the volumes of soil associated with various disposal categories. In some cases, analytes present in soil that are not the target of the SO-5 remedial effort (e.g., lead) have concentrations that could potentially indicate these soils are characteristically hazardous. In general, the “RCRA 20X Rule” has been used as a means of conservatively estimating if soils could be considered characteristically hazardous.

Excavated soils would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the soils would be deemed hazardous, the soil would be mixed with suitable stabilization agent(s) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste.

Refer to Appendix C for further discussion of categorization of contaminated soil types and estimation of volumes associated with these soil types. The table below presents a description of the various soil types, the volumes of these soil types (after excavation), assumptions regarding the potential for these soils to be deemed characteristically hazardous waste, and whether stabilization may be necessary prior to off-Site disposal based on data collected as part of the RI.

Remedial Area	**Waste Description**	**Potentially Hazardous Based on "20X Rule"?**	**Estimated Volume (Cubic Yards)**	**Stabilization Potentially Necessary Prior to Disposal?**
TCE Hot Spot Near SB-09	Soil TCE greater than 10 ppm, and/or lead greater than 100 ppm	Yes	100	Yes
	Soil with TCE less than 10 ppm, and lead less than 100 ppm	No	300	No
Asbestos Hot Spot	Soil with Asbestos greater than the PRG and lead less than 100 ppm	No	30	No
	Soil with Asbestos greater than the PRG and lead greater than 100 ppm	Yes	30	Yes
PAH- and Arsenic-Impacted Soil	Soil with lead and/or arsenic greater than 100 ppm	Yes	1,900	Yes
	Soil with lead and arsenic less than 100 ppm	No	800	No

4.2.5.3 Maintenance of New Asphalt Cover

This alternative includes measures to maintain and repair the newly installed asphalt caps in those areas where contaminated soil remains. For costing purposes, it is assumed that approximately 5% of the asphalt would be replaced every year.

4.2.5.4 Clean-up Timeframe

It is estimated that the time necessary to complete the SO-5 alternative (absent the long-term maintenance requirements) would be approximately one month from initiation of excavation activities.

4.2.6 Alternative SO-6: Comprehensive Excavation and Off-Site Disposal

Those areas where soil COC concentrations exceed their PRGs under the currently allowed use scenario include SO Area #1 (TCE-impacted soil), SO Area #3 (PAH-, asbestos- and/or arsenic-impacted soil; SO Area #2 is within Area #3), and SO Area #4 (PAH-impacted soil) and are depicted on Figure 24. Alternative SO-6, the Comprehensive Excavation and Off-Site Disposal of Contaminated Soils alternative, includes excavation of the same TCE- and asbestos-impacted soils that were removed in the SO-4 and SO-5 alternatives and long-term monitoring. Additionally, the shallow soils (1 to 2 ft bgs) removed in the SO-5 alternative will also be removed in Alternative SO-6. For brevity, the excavation and off-Site disposal activities similar to Alternative SO-5 are not repeated herein.

In addition, SO-6 includes excavation of PAH- and arsenic-impacted soils to full depths necessary to meet PRGs for those contaminants and their disposal off-site. Excavations will be refilled to grade. Institutional controls will be established to prevent residential use and establish a soil management plan for inaccessible soils below existing buildings. Long-term monitoring of institutional controls will be conducted in coordination with monitoring of contaminated groundwater under the SO waste management area addressed under the SW alternatives.

An itemized cost estimate, and supporting calculations and assumptions for alternative SO-6 are presented in Appendix D-2e. A summary of costs for this alternative is presented in Table 13B.

4.2.6.1 Pre-Design Investigations

Pre-design investigations focused on further delineating the extent of soil COCs that exceed their current allowed use PRGs would be necessary to appropriately design the remedial measures proposed as part of this alternative. For costing purposes it is assumed that approximately 20 soil samples would be collected in the vicinity of soil boring SB-09 near the TCE Hotspot. These soil samples would be submitted for laboratory analysis of VOCs. It is also assumed that approximately 10 soil samples would be collected in the vicinity of M&E soil boring I-3.5 near the Asbestos Hotspot. These soil samples would be submitted for

laboratory analysis of asbestos. In addition, it is assumed that 1 sample would be collected from 0 to 2 ft bgs for every 400 ft^2 of area where PAH and/or arsenic concentrations greater than their respective PRGs are suspected. Based on an approximate area of soil with PAH and/or arsenic concentrations greater than their respective PRGs, it is estimated that approximately 134 soil samples would be collected and submitted for laboratory analysis for PAHs and/or arsenic. For costing purposes, it is assumed that soil samples would be collected in a manner consistent with soil samples collected during the RI. In addition, representative numbers of these soil samples would be submitted for appropriate laboratory analysis to provide waste characterization data that would be the basis for potential disposal options.

In the event that the results of waste characterization indicate that the soils would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the soils non-hazardous on-Site. This would allow their disposal off-Site as non-hazardous waste and allow for potential cost savings.

4.2.6.2 Excavation of Soils

As indicated above, soils excavated in the SO-5 alternative would also be excavated in the SO-6 alternative; therefore, for brevity, a summary of excavation of the TCE- and asbestos-impacted soils (as well as shallow PAH- and/or asbestos-impacted soils) is not repeated herein.

Under the current allowed use scenario, it is assumed that a child is exposed to site soils. Hence, removal of PAH- and arsenic-impacted soils that exceed daycare child PRGs would entail excavation varying depths of soil depending on the COC concentrations found. Subsequent to completing the excavation, clean fill soils would be placed and compacted in the excavations. Where the excavation is completed in areas that are paved, repaving these areas with like material subsequent to backfilling the excavations would be included.

In addition to the confirmatory soil sampling described in the SO-4 alternative, soil samples would be collected from around the perimeter of the PAH/arsenic-impacted soil excavation(s) to confirm that soils that exceed daycare child PRGs are removed.

Limited data are available pertaining to the RCRA hazardous characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of soils that would be excavated as part of the SO-6 alternative. Because of the relatively limited Site soil data pertaining to disposal characterization, assumptions have been made regarding the volumes of soil associated with various disposal categories. In some cases, analytes present in soil that are not the target of the SO-6 remedial effort (e.g., lead and arsenic) have concentrations that could potentially indicate these soils are characteristically hazardous. In general, the “RCRA 20X Rule” has been used as a means of conservatively estimating if soils could be considered characteristically hazardous. Excavated soils would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the soils would be deemed hazardous, the soil would be mixed with suitable stabilization agent(s) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste.

Refer to Appendix C for further discussion of categorization of contaminated soil types and estimation of volumes associated with these soil types. The table below presents a description of the various soil types, the volumes of these soil types (after excavation), assumptions regarding the potential for these soils to be deemed characteristically hazardous waste, and whether stabilization may be necessary prior to off-Site disposal based on data collected as part of the RI.

Remedial Area	Waste Description	Potentially Hazardous Based on "20X Rule"?	Estimated Volume (Cubic Yards)	Stabilization Potentially Necessary Prior to Disposal?
TCE Hot Spot Near SB-09	Soil TCE greater than 10 ppm, and/or lead greater than 100 ppm	Yes	100	Yes
	Soil with TCE less than 10 ppm, and lead less than 100 ppm	No	300	No
PAH-, Asbestos-, and/or Arsenic-Impacted Soil	Soil with lead and/or arsenic greater than 100 ppm	Yes	2700	Yes
	Soil with lead and arsenic less than 100 ppm	No	5100	No

4.2.6.3 Clean-up Timeframe

It is estimated that the time necessary to complete the SO-6 alternative (absent the long-term maintenance requirements) would be approximately two months from initiation of excavation activities.

4.3 Description of Area of Containment Remedial Alternatives (AOC Alternatives)

The AOC is depicted on Figure 29. The RAOs for soils in the AOC include:

- Prevent inhalation of asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs;

- Prevent exposure to currently covered soils in the AOC that would result in unacceptable levels of risk to a future human receptor; and
- Prevent exposure to currently covered soil in the AOC that would result in an unacceptable level of risk to an ecological receptor.

As described in Section 2, since there is presumptive risk in the AOC, neither COCs, nor "typical" PRGs were developed for this area of the Site. Rather, the RAOs are based on maintaining the protectiveness of the existing remedy that was constructed during the previous CERCLA removal action.

The AOC remedial alternatives for this FS are designated as:

AOC-1: No Action;
AOC-2: Limited Action;
AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls; and
AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls.

Detailed descriptions of these AOC alternatives are provided in the following sub-sections.

4.3.1 Alternative AOC-1: No Action

Alternative AOC-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP under Section 300.68. This alternative is proposed as a means of identifying the problems posed by the Site if no additional remedial actions are implemented, beyond the present AOC cover over contaminated soils constructed during the CERCLA removal action. "No Action" as used in this Section means no measures are proposed to maintain or monitor the current remedy in the AOC. Statutorily-required Five-Year Reviews would still need to be conducted under this alternative. Because no remedial measures would be implemented as part of this alternative, there are no costs associated with AOC-1, other than the cost of conducting Five-Year Reviews (see Table 13C).

4.3.2 Alternative AOC-2: Limited Action

Alternative AOC-2, the Limited Action alternative, consists of measures, generally institutional controls and access restrictions, to protect human health and ecological receptors by maintaining and monitoring the existing AOC cover to limit exposure to contaminants. This alternative does not involve active treatment/removal of contaminants. An itemized cost estimate for alternative AOC-2 is presented in Appendix D-3a. A summary of costs is presented in Table 13C.

A deed restriction for the AOC that precludes development of this portion of the Site was established during the 1992 RA. This alternative includes evaluating this deed restriction to confirm that it contains adequate provisions to protect human health and ecological receptors. In addition, it is assumed that the deed restriction that would become finalized as part of this

alternative would include provisions for a soil management plan. The deed restriction would include a description of permitted activities and uses, and a summary of activities and uses that are not permitted. Specifically, the deed restriction would preclude redevelopment of the Site in the area of cover, restrictions on exposure to contaminated soils under buildings, and protection of the Neponset River culvert. A component of this deed restriction would also include requirements of adhering to the guidelines of a soil management plan, which would be established for non-restricted activities (e.g., maintenance of the aluminum culvert).

This alternative includes measures to maintain and repair the soil- and asphalt-capped portions of the AOC. For costing purposes, it is assumed that approximately 5% of the pavement and soil over the asphalt- and soil-capped portion of the AOC would be replaced every year. In addition, this alternative includes maintaining the existing fencing surrounding the AOC, and installing and maintaining appropriate warning signs. For costing purposes, it is assumed that maintenance of the fence would include replacing approximately 10% of the fencing every 5 years. A pre-design study would be necessary to evaluate/determine long-term maintenance costs associated with the aluminum culvert.

Quarterly Site inspections would be performed to verify the integrity of asphalt and soil caps, and fencing. Annual inspections of the culvert also are included in this alternative. There would be yearly monitoring and reporting of compliance with institutional controls. In addition, a review of Site conditions and risks would be performed at five-year intervals, and these conditions would be documented in a report. This measure is a statutory requirement of CERCLA that applies to remedial actions in which contaminants remain on-Site.

Site soil conditions would likely remain relatively unchanged, except for changes brought about by naturally occurring processes (e.g., natural attenuation). Concentrations of soil COCs are expected to exceed PRGs for greater than 100 years.

4.3.3 Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls

This alternative consists of measures, generally institutional controls and access restrictions to protect human and ecological receptors by limiting exposure to contaminants that are consistent with those measures included in AOC-2. For brevity, the AOC-2 remedial measures are not repeated in this section. In addition, this alternative eliminates potential human health or ecological risks from the contaminated soils in the Settling Basin #2 Containment Cell by excavation and off-Site disposal of these materials.

An itemized cost estimate, and supporting calculations and assumptions for alternative AOC-3 are presented in Appendix D-3b. A summary of costs is presented in Table 13C.

4.3.3.1 Pre-Design Investigations

Prior to initiating excavation of the Settling Basin #2 Containment Cell, soil samples would be collected and submitted for appropriate laboratory analysis to provide waste characterization

data that would be the basis for potential disposal option decisions. In addition, these borings would be used to determine the physical characteristics of the Portland cement-stabilized soils that were placed in the Settling Basin #2 Containment Cell (e.g., are they hard/concrete-like material). For costing purposes, it is assumed that the physical character of these materials is "soil-like".

In the event that the results of waste characterization indicate that the soils would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the soils non-hazardous on-Site. This could allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste.

A pre-design study would also be necessary to evaluate/determine long-term maintenance costs associated with the aluminum culvert.

4.3.3.2 Excavation of Settling Basin #2 Containment Cell

As described in Section 2.3.2 and depicted on Figure 25, it is estimated that approximately 2,500 cubic yards of material are located in the Settling Basin #2 Containment Cell. This alternative includes excavating contaminated soils located in the Settling Basin # 2 Containment Cell and the HDPE liner that currently contains these soils, off-Site disposal of these soils, and backfilling and grading the excavation area with clean fill and a vegetated cover similar to the soil-capped AOC (i.e., grass).

Limited data are available pertaining to the RCRA hazardous characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of soils that would be excavated as part of the AOC-3 alternative. However, as described in the EDRA Report, these soils were stabilized with Portland cement subsequent to excavation from the Former Mill Tailrace and prior to emplacement in the HDPE-lined Settling Basin #2 Containment Cell. Therefore, for costing purposes, it is assumed that the soils contain asbestos, but are not characteristically hazardous. Nonetheless, as indicated above, excavated soils would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the soils would be deemed hazardous, the soil would be mixed with suitable stabilization agent(s) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste. Costs for additional soil stabilization or treatability studies have not been included in this FS.

4.3.3.3 Maintenance of Existing Soil and Asphalt Capped Portion of the AOC and Aluminum Culvert

As indicated above, alternative AOC-3 includes all of the measures proposed under AOC-2, plus those further described above. Therefore, the maintenance requirements described in AOC-2 would be included as part of this alternative. Refer to Section 4.3.2 for further discussion of maintenance of the soil and asphalt capped portions of the AOC, and the aluminum culvert that contains the Neponset River through the AOC.

4.3.3.4 Clean-up Timeframe

It is estimated that the time necessary to complete the excavation of the Settling Basin #2 Containment Cell would be two to four months from initiation of excavation activities. Since the remaining AOC contaminated soils would remain on-Site under this alternative, for costing purposes, it is assumed that monitoring and maintenance of the soil and asphalt cap would be required for 100 years.

4.3.4 Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls

Alternative AOC-4 includes excavation of contaminated soils located above the groundwater table in the soil and asphalt capped portions of the AOC (including the Settling Basin #2 Containment Cell) and off-Site disposal of these soils. This alternative would include removal of the aluminum culvert that contains the Neponset River in the AOC, and restoring/stabilizing the riverbank of the Neponset River. This alternative also includes institutional controls and access restrictions, to protect human and ecological receptors by limiting exposure to contaminants below the water table. These measures are generally consistent with those measures included in AOC-2. For brevity, the AOC-2 remedial measures (monitoring and institutional controls) are incorporated in this section

An itemized cost estimate, and supporting calculations and assumptions for alternative AOC-4 are presented in Appendix D-3c. A summary of costs is presented in Table 13C.

4.3.4.1 Pre-Design Investigations

Pre-design investigations focused on further delineating the extent of contaminated soils in the AOC would be necessary to appropriately design the remedial measures proposed as part of this alternative. For costing purposes it is assumed that the assessment of the occurrence of fill soils would be made based on visual observations during logging of soil borings completed as part of this alternative. It is assumed that one soil boring would be completed for every 400 ft^2 of area in the soil- and asphalt-capped portions of the AOC. Based on an approximate combined total area of the soil-capped and asphalt-capped portions of the AOC, it is estimated that approximately 280 soil borings would be installed to depths of approximately 15 ft bgs. For costing purposes, it is assumed that methods for soil boring installation and classification of soil samples would be consistent with methods used during the RI. In addition, representative numbers of these soil samples would be submitted for appropriate laboratory analysis to provide waste characterization data that would be the basis for potential disposal options.

In the event that the results of waste characterization indicate that the soils would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the soils non-hazardous on-Site and allow their disposal off-Site as non-

hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste.

4.3.4.2 Excavation of AOC, Settling Basin #2 Containment Cell Removal of Aluminum Culvert, Covering any Waste Left in Place

Figure 29 depicts those areas of the AOC that would require remedial action. Prior to excavation, the Neponset River would be diverted from its current course through the Site to limit the potential for contaminated sediments to enter the river during a portion of this excavation effort, and to more easily allow the culvert to be removed from the AOC. To divert the river, diesel- or electric-powered centrifugal pumps with sufficient pumping capacity to accommodate the river flow would be installed near the river upgradient of the Site. Discharge piping would be installed for the pumps to a location downstream of the excavation area. While the pumps were in operation, sheet piling would be installed across the river, upgradient and downgradient of the AOC. With the sheet piling in place and the pumps operating, the river course between the sheet pile walls could be dewatered to permit excavation in dry conditions. It is assumed that diversion of the river and excavation of the AOC would occur during the dry months of the year to limit the overall flow in the Neponset River and limit the capacity of the pumps to the degree possible.

Once the river diversion system is in place and operating, the soil cap of the AOC would be stripped off, tested to see if it meets standards for reuse, and, if clean, stockpiled for subsequent use as backfill material. Contaminated soils in the AOC would be excavated to depths no greater than the groundwater table. Subsequent to completing the excavation, clean fill soils would be placed in the excavation using new clean fill and the stockpiled existing soil cap. The site would be graded to elevations approximately equivalent to pre-Removal Action conditions, except where the culvert is currently located and where contaminated soils remain below the groundwater table. In these areas, a sufficient soil cover will be installed to be protective of human health and the environment. Where the excavation is completed in areas that are paved, the areas will be repaved with like material subsequent to backfilling the excavations. Where the excavation is completed in areas that are unpaved, soils would be covered with a vegetated cap (e.g., grass).

As indicated above, the aluminum culvert that contains the Neponset River in the AOC would be removed as part of this alternative. While the Neponset River is diverted, the aluminum culvert and associated backfill material would be excavated in sections. Excavated soils and the aluminum culvert would be disposed off-Site with excavated AOC soil. Subsequent to excavation of the culvert, the banks of the excavation and the bottom of Neponset River, would be stabilized with suitable river bottom materials, likely consisting of gravel, cobbles, and other material sized to resist erosion. The reconstructed riverbanks would be stabilized with appropriately designed vegetation or other slope stabilization techniques (e.g., riprap) to resist erosion. For costing purposes, the approximate grades of the backfilled excavation and the stabilized Neponset River would be consistent with grades prior to the 1992 Removal Action.

Limited data are available pertaining to the RCRA hazardous characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of contaminated soils in the soil- or asphalt-capped portions of the AOC. Because of the relatively limited Site soil data pertaining to disposal characterization, assumptions have been made regarding the volumes of soil associated with various disposal categories. In some cases, there are analytes present in soil with concentrations that could indicate these soils are characteristically hazardous. In general, the "RCRA 20X Rule" has been used as a means of conservatively estimating if soils could be considered characteristically hazardous when excavated. Excavated soils would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the soils would be deemed hazardous, the soil would be mixed with suitable stabilization agent(s) to render the soils non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the soils off-site as hazardous waste.

Soils in the Settling Basin #2 Containment Cell were originally excavated from the Former Mill Tailrace. TCLP sample results of the sediment/soil from the Former Mill Tailrace indicated that the wastes were characteristically hazardous. However, prior to being placed in the Settling Basin #2 Containment Cell, these soils were stabilized with Portland cement. Therefore, it is assumed that these soils once excavated would not be determined to be hazardous waste.

Refer to Appendix C for further discussion of categorization of soil types and estimation of volumes associated with these soil types. The table below presents a description of the various soil types, the volumes of these soil types, assumptions regarding the potential for these soils to be deemed characteristically hazardous waste, and whether stabilization may be necessary prior to off-Site disposal.

Remedial Area	Waste Description	Potentially Hazardous Based on "20X Rule"?	Estimated Volume (Cubic Yards)	Stabilization Potentially Necessary Prior to Disposal?
AOC Soils	Soil with asbestos greater than the PRG and lead greater than 100 ppm or other metals at concentrations above the 20X rule	Yes	18,300	Yes
	Soil with asbestos greater than the PRG and lead less than 100 ppm and other metals at concentrations below the 20X rule	No	19,200	No
Settling Basin #2 Containment Cell	Soil with Asbestos greater than the PRG and metals assumed to be within TCLP limits based on prior stabilization with Portland cement	No	1,500	No

4.3.4.3 Clean-up Timeframe

It is estimated that the time necessary to complete the AOC-4 alternative would be approximately 6 to 12 months from initiation of excavation activities. Since contaminated soils would remain on-Site under this alternative, for costing purposes, it is assumed that monitoring and maintenance of the soil and asphalt cap would be required for 100 years.

4.4 Description of Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond Sediment Remedial Alternatives (SSW Alternatives)

The areas requiring remediation in the Former Mill Tailrace, the Neponset River Floodplain, and Lewis Pond are depicted on Figure 30. The RAOs for sediment/soil include:

- Prevent ingestion of sediment/soil by a future resident/construction worker with lead concentrations resulting in PBL 5%, and meet ARARs; and
- Prevent inhalation of asbestos fibers from sediment/soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs.

PRGs for these sediments and soils are presented on Tables 5 and 3B, respectively.

The SSW remedial alternatives for this FS are designated as:

SSW-1: No Action;
SSW-2: Limited Action;
SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment;
SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment; and
SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond.

Prior to initiating remedial action on asbestos- and lead-impacted soil/sediment, further assessment of the distribution of asbestos should be conducted to determine where asbestos and/or lead are present in soil/sediment at concentrations that warrant remedial action.

Detailed descriptions of these SSW alternatives are provided in the following sub-sections.

4.4.1 Alternative SSW-1: No Action

Alternative SSW-1, the No Action alternative, is developed and evaluated for baseline comparison purposes as described in the NCP under Section 300.68. This alternative is proposed as a means of identifying the problems posed by the Site if no remedial actions are implemented to address the above-described sediment/soil contamination. "No Action" as used in this Section means no measures are proposed to address sediment/soil contamination at the Former Mill Tailrace, the Neponset River Floodplain, and Lewis Pond. Statutorily-required Five-Year Reviews would be conducted to assess the protectiveness of the remedy. Because no remedial measures would be implemented as part of this alternative, there are no costs associated with SSW-1 other than the costs for conducting the Five-Year Reviews (see Table 13D).

4.4.2 Alternative SSW-2: Limited Action

Alternative SSW-2, the Limited Action alternative, consists of long-term monitoring, institutional controls and limited access restrictions, to protect human health by limiting

exposure to contaminants. This alternative does not involve active treatment/removal of contaminants. An itemized cost estimate for alternative SSW-2 is presented in Appendix D-4a. Costs are summarized on Table 13D.

The SSW-2 alternative includes establishing institutional controls to preclude disturbance of areas that have soil or sediment COC concentrations greater than PRGs. The areas to be subject to the institutional controls are zoned residential. This action involves preparation of deed restrictions for properties in this area of the Site. The deed restrictions would include a description of permitted activities and uses, and a summary of activities and uses that are not permitted. Specifically, the deed restrictions would preclude disturbance of soils or sediments except under specified conditions. A component of this deed restriction would also include requirements of adhering to the guidelines of a soil/sediment management plan, which would be established for specific activities (e.g., maintenance of the Lewis Pond dam).

This alternative includes installing approximately 3,350 lineal feet of fencing around those areas that are impacted at the approximate locations depicted on Figure 30. For costing purposes, it is assumed that a six-ft-high chain link fence with three strands of barbed wire would be the type of fence installed. It is also assumed that maintenance of the fence would include replacing approximately 10% every 5 years.

Quarterly Site inspections would be performed to verify the integrity of the fencing. There would be at least yearly monitoring and reporting on compliance with institutional controls. In addition, a review of Site conditions and risks would be performed at five-year intervals and these conditions would be documented in a report. This measure is a statutory requirement of CERCLA that applies to remedial actions in which contaminants remain on-Site.

At least yearly monitoring would determine if contaminants are migrating or are decreasing in the soil/sediments. If monitoring determines that characteristic hazardous wastes are present, ARARs need to be complied with, unless waived. Site soil and sediment conditions would likely remain relatively unchanged. Concentrations of soil and sediment COCs are expected to exceed PRGs for greater than 100 years. Statutorily-required Five-Year Reviews would be conducted to assess the protectiveness of the remedy.

4.4.3 Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment

Alternative SSW-3 involves excavation and off-Site disposal of the sediment/soils located on Lots 33-257 and 33-360, and dredging/excavating of sediments located in the Former Mill Tailrace. In addition, an aqueous cap would be maintained over contaminated sediments in Lewis Pond by controlling the water levels at the Lewis Pond Dam at West Street. An itemized cost estimate, and supporting calculations and assumptions for alternative SSW-3 are presented in Appendix D-4b. Costs are summarized in Table 13D.

The key components of this alternative include excavation and dredging of sediment/soils, maintaining an aqueous cap on sediments located in Lewis Pond, long-term monitoring, and institutional controls. These components are discussed in the following subsections.

4.4.3.1 Excavation of Soil on Neponset River Lots 33-257 and 33-360, and Dredging/Excavation of Sediment in the Former Mill Tailrace

The table below summarizes the approximate volumes of sediment/soil in those areas that would be excavated/dredged as part of the SSW-3 remedial alternative. These areas are depicted on Figure 26.

Sediment /Soil Area Designation	COC(s) with Concentrations Higher than PRGs	Assumed Depth of Sediment /Soil COCs greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Former Mill Tailrace	Asbestos	1	1,200	50
Lot #33-360	Asbestos	1	4,400	200
Lot #33-257	Asbestos/Lead	1	17,000	600

Pre-Excavation Sediment/Soil Sampling and Analysis

To confirm the limits of sediment/soil excavation/dredging and assess textural/geotechnical properties of the sediment/soil, a pre-excavation/dredging sampling and analysis program is proposed as part of this alternative. In general, three samples (one sample collected from 0 to 1 ft bgs, one sample from 1 to 2 ft bgs, and one sample from 2 to 3 ft bgs) per 400 ft^2 would be collected from each area for a total of approximately 170 samples. The samples would be submitted for laboratory analysis of asbestos, and in the case of Lot #33-257, lead and asbestos. Approximately one-half of the samples submitted for laboratory analysis for contaminants would also be analyzed for moisture content, bulk density, and grain-size distribution to further refine potential excavation and dewatering methods. The sample locations would be surveyed, and a sediment/soil sampling report would be prepared.

Sediment and Soil Excavation/Dredging and Dewatering

Prior to initiating dredging/excavation activities in the Former Mill Tailrace, turbidity curtains would be positioned to limit sediments from migrating downstream during dredging activities. These turbidity curtains would be periodically replaced and/or repositioned as necessary during the dredging process

Mechanical sediment dredging using a 2-cubic yard clamshell excavator, or similar equipment, is proposed for dredging/excavating the Former Mill Tailrace. The excavator would move along the perimeter of the remedial area and reach into the excavation area to dig out the sediment. Water would likely be allowed to drain back into the excavation from the sediment in the clamshell bucket, but the sediment would likely retain a significant amount of water. The amount of water remaining in the excavated sediment prior to dewatering is assumed to be approximately 50 percent by volume on average.

A loader and skid steer would be used to move dredge spoils into roll-off filter containers. Water draining from the sediment would pass through a filter cloth and screen at the bottom of the container and would be pumped to fractionation (frac) tanks for characterization sampling and analysis prior to off-Site treatment/disposal. A hose connected to a vacuum truck could be connected to the bottom of the containers to assist in dewatering the sediment and transferring the water to frac tanks.

Excavation with either an excavator or loader is proposed for excavating soils on Lot 33-257 and Lot 33-360. Excavation would be performed "in the wet" due to the presence of asbestos in these soils. Soils would be loaded directly into covered roll-off dumpsters for off-Site disposal[23].

Following excavation and dredging, confirmatory sampling and analysis is proposed. Approximately one sample would be collected for every 400 ft^2 of excavated area for a total of approximately 55 samples, conservatively assuming that the full area depicted on Figure 30 is subject to remediation. The samples would be analyzed for asbestos, and additionally in the case of soils excavated from Lot 33-257, lead. Clean-up levels are set to allow unrestricted use of the area after completion of the remedial action.

Following excavation on Lot 33-257 and Lot 33-360, clean backfill material and a vegetated cover (i.e., grass) would be placed to approximately the pre-excavation grades. The Former Mill Tailrace is a wetland and will therefore require wetlands restoration, which is discussed further below.

Disposal of Dewatered Sediment/Soil and Water

Limited data are available pertaining to the RCRA hazardous characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of sediments/soils excavated as part of this alternative. Because of the relatively limited Site data pertaining to disposal characterization, assumptions have been made regarding the volumes of sediment/soil associated with various disposal categories. In some cases, analytes are present in sediment/soil with concentrations that could indicate these sediments/soils are hazardous by characteristic. In general, the "RCRA 20X Rule" was used as a means of conservatively estimating if sediments/soils could be considered

[23] On-site consolidation and disposal of sediment/soil is likely less cost-effective than off-Site disposal for sediment/soil generated as part of this alternative. Refer to Appendix C for further discussion/evaluation of on-Site versus off-Site disposal of sediment/soil. Potential disposal options will be further evaluated during remedial design; however, for costing purposes, it is assumed that soil/sediment will be disposed off-Site.

hazardous by characteristic. Excavated soils and dredged sediments would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the materials would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the materials non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the materials off-site as hazardous waste.

For waste characterization purposes, it is assumed that dewatered sediment/soil would be sampled at a frequency of one sample per 500 tons, or a total of three samples for the presumed dewatered sediment/soil quantity of approximately 1,290 tons. Water samples would be collected at a presumed frequency of one sample per frac tank (approximately 21,000 gallons), or a total of one sample for the presumed water volume of 5,000 gallons.

Refer to Appendix C for further discussion of categorization of sediment/soil types and estimation of volumes. The table below presents a description of the various sediment/soil types, the volumes of these material types, assumptions regarding the potential for these materials to be deemed hazardous waste, and whether stabilization may be necessary prior to off-Site disposal.

Remedial Area	**Waste Description**	**Potentially Hazardous Based on "20X Rule"?**	**Estimated Volume (Cubic Yards unless otherwise indicated)**	**Stabilization Potentially Necessary Prior to Disposal?**
Former Mill Tailrace	Sediment/soil with asbestos greater than the PRG and lead greater than 100 ppm	Yes	50	Yes
	Water from dewatering sediments	No	5,000 gallons	Not Applicable
Lot #33-360	Sediment/soil with asbestos greater than the PRG and lead greater than 100 ppm	Yes	200	Yes
Lot #33-257			600	

Wetlands Restoration

Dredging activities to address sediment contamination would occur within the wetland area of the Former Mill Tailrace. Therefore, restoration of wetlands where sediment dredging would occur is a proposed component of this alternative.

The success of wetlands restoration would depend in part on the design, which ties the restored and constructed wetlands areas with the existing hydrology of the Former Mill Tailrace. Pre-design investigation activities would be focused on obtaining the data needed to achieve this goal. Prior to sediment dredging, further characterization of soils, vegetation, and hydrology would be performed. A wetland functional assessment would be conducted to assess the existing functions and values of the wetland.

Restoration of wetlands within the sediment dredging areas would be accomplished by post-dredging grading, importing wetland soils, planting wetlands vegetation, and modifying surface water flow patterns so that the restored area receives adequate water.

Monitoring of the restored wetlands would involve three visits: one after the first month, one at the end of the first growing season, and one at the end of the second growing season to assess plant hardiness and mortality.

4.4.3.2 Maintaining Aqueous Cap on Lewis Pond Sediments

The second component of the SSW-3 alternative includes maintaining an aqueous cap on sediments located in Lewis Pond to prevent asbestos from becoming airborne, and hence prevent potential human health risks. The areas that would need to be covered by water in this alternative are described in the table below and are depicted on Figure 30.

Sediment Area Designation	COC(s) with Concentrations Higher than PRGs	Approximate Areal Extent (ft^2)
Lewis Pond Area #1	Asbestos	22,000
Lewis Pond Area #2	Asbestos	15,000
Lewis Pond Area #3	Asbestos	9,400

A recent dam inspection[24] was performed by Goldsmith, Prest & Ringwall, Inc. (GPR) on behalf of Historic Realty, the owners of the West Street Dam. The report summarizing the methods and findings of this inspection is included as Appendix A. The elevation of the top of the wooden flashboards for the West Street Dam is approximately 140 ft Above Mean Sea Level (AMSL). Assuming that a water level of 140 ft could be maintained at the West Street Dam, Figure 30 depicts the approximate area that would be covered with water in Lewis Pond

[24] Goldsmith, Prest & Ringwall, Inc., 2007, "Kendall Mills Dam – Phase I Inspection / Evaluation Report," June 2007.

as part of this alternative. The area covered by water includes some of Lewis Pond Area #1 and most of Lewis Pond Areas #2 and #3.

Pre-Design Investigations

In order for the aqueous cap to be effective at adequately limiting asbestos from becoming airborne, the water level at the West Street Dam (see Figure 30) needs to be maintained at an elevation sufficient to cover impacted sediments, or to allow for sufficient sediment moisture content to substantially limit asbestos from becoming airborne.

To confirm the limits of impacted sediment, a sampling and analysis program is proposed as part of this alternative. In general, three samples (one sample collected from 0 to 1 ft bgs, one sample from 1 to 2 ft bgs, and one sample from 2 to 3 ft bgs) per 400 ft^2 would be collected from the Lewis Pond Areas 1, 2, and 3 for a total of approximately 350 samples. The sample locations would be surveyed, and a sediment sampling report would be prepared.

In addition, a topographic survey of the Lewis Pond area would be conducted to evaluate the water level elevation that would be necessary to maintain an aqueous cap over impacted sediments, or to allow for sufficient soil moisture to limit asbestos from becoming airborne.

A pre-design study of the existing West Street Dam would also be conducted as part of this alternative to evaluate the adequacy of the dam to maintain the required water level in Lewis Pond as determined by the sediment sampling and topographic survey. In addition, consistent with GPR's recommendations, a pre-design study of the long-term (100 year design life) structural capacity of the dam to maintain the water level in the pond at 140 ft AMSL and to safely discharge excess flow during storm events would be performed to evaluate this alternative further. A report summarizing the findings of this assessment would be prepared.

During remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place. If so, the aqueous cap will not comply with relevant and appropriate hazardous waste standards.

Modifications to the West Street Dam

The existing West Street Dam is a 7.7 foot-high (with flashboards installed), 35 foot-long run-of-the-river type structure, with its spillway extending across the entire length of the dam. The foundation walls of the existing former mill building form the right and left dam abutments. The dam is constructed of concrete with an overlying wooden structure supporting removable flashboards and one low and one mid-level discharge gate. The discharge gates are hand operated and can be raised to lower the Pond level in anticipation of a flood event or for dam maintenance purposes. The flashboards can also be removed to lower the Pond. Access to the gate mechanisms and the flashboards is provided from a wooden deck constructed over the gate/flashboard structure.

The GPR report indicates that the dam is in fair condition with some concrete spalling observed on the downstream spillway, and upstream and downstream training walls, and some wear on the wooden gate/flashboard structure. GPR recommended that a formal Operation and Maintenance Plan and Manual, and Emergency Action Plan be prepared for the ongoing operation of the dam. GPR also recommended that minor repairs be made to the concrete and mortared stone portions of the dam, and to the wooden gate/flashboard structure. GPR further advised that consideration be given to replacing the gate/flashboard structure and mechanism with a more modern and durable structure, and replacing the wooden deck with a steel grate deck for access.

While the existing West Street Dam could be used to effectively maintain the water levels in Lewis Pond at 140 ft AMSL if an operator were present on-Site, it is assumed that modifications would be implemented to maintain the integrity of the dam, and to automate maintenance of water levels at the Dam with steel gates and mechanical components that are remotely and/or automatically controlled in the event of large storms.

Deed Restriction, Inspection, and Maintenance of Aqueous Cap

This action involves preparation of deed restrictions to preclude removal of the West Street Dam. A component of this deed restriction would include requirements of adhering to the guidelines of a sediment management plan, which would be established for potential activities in aqueous capped portions of the Site which are located in residential areas.

Access restrictions such as fencing will be necessary to restrict long-term access to the water's edge by abutters.

Quarterly inspections of the aqueous capped areas would be conducted to verify proper operation of the remedy.

The dam would be inspected and minor repairs performed on an annual basis. The inspection would include: removal of any debris that had accumulated at the upstream face of the dam; observation and repair of the mortared stone upstream training walls; observation and repair of the concrete in the downstream wing walls; observation and repair of the flashboard/gates structure and access decks; and lubrication and exercising of the low and mid-level outlet gates.

Monitoring of the wetlands would involve three visits: one after the first month, one at the end of the first growing season, and one at the end of the second growing season to assess plant hardiness and mortality.

At least yearly monitoring would determine if contaminants are migrating or are decreasing in the soil/sediments. Monitoring would also determine if characteristic hazardous wastes are present in Lewis Pond sediments. If so, the alternative would need to comply with hazardous waste ARARs, unless waived. There would also be yearly monitoring and reporting on compliance with institutional controls.

The SSW-3 alternative also includes a review of Site conditions and risks at five-year intervals and documentation of these conditions in a report. This measure is a statutory requirement of CERCLA that applies to remedial actions in which contaminants remain on-Site.

Clean-up Time-frame

It is estimated that the time necessary to complete the SSW-3 alternative (absent the long-term maintenance and monitoring requirements) would be approximately 3 to 4 months from initiation of construction activities. Concentrations of asbestos in Lewis Pond sediment are expected to remain relatively unchanged beneath those areas covered by an aqueous cap for greater than 100 years

4.4.4 Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment

Alternative SSW-4 involves excavation and off-Site disposal of the sediments/soils located on Lots 33-257/33-360, and dredging of sediments located in the Former Mill Tailrace (see Figure 30). In addition, an engineered subaqueous cap would be installed over contaminated sediments in Lewis Pond. Long-term monitoring and institutional controls will also be required. An itemized cost estimate, and supporting calculations and assumptions for alternative SSW-4 are presented in Appendix D-4c. Costs are summarized in Table 13D.

The key components of this alternative include excavation and dredging of soils/sediment, and installing an engineered subaqueous cap on sediments located in Lewis Pond. The excavation and dredging component of this alternative is identical to the excavation and dredging activities for SSW-3 discussed in Section 4.4.3.1; therefore, those components of the alternative will not be discussed again herein. Rather, the reader is referred to Section 4.4.3.1 for a description of the excavation and dredging component of this alternative. The second component of the SSW-4 alternative involves installing and maintaining an engineered subaqueous cap to isolate Lewis Pond sediments.

4.4.4.1 Install and Maintain Cap on Lewis Pond Sediments

As indicated above, the second component of the SSW-4 alternative includes installing and maintaining an engineered subaqueous cap on sediments located in Lewis Pond to prevent exposures by human receptors to sediment with asbestos concentrations greater than the PRG. The areas that would be capped as part of the SSW-4 alternative are described in the table below and are depicted on Figure 30.

Sediment Area Designation	COC(s) with Concentrations Higher than PRGs	Approximate Areal Extent (ft^2)
Lewis Pond Area #1	Asbestos	22,000
Lewis Pond Area #2	Asbestos	15,000
Lewis Pond Area #3	Asbestos	9,400

Pre-Design Investigations

To confirm the limits of impacted sediment, a sampling and analysis program is proposed as part of this alternative. In general, three samples (one sample collected from 0 to 1 ft bgs, one sample from 1 to 2 ft bgs, and one sample from 2 to 3 ft bgs) per 400 ft^2 would be collected from the Lewis Pond Areas 1, 2, and 3, for a total of approximately 350 samples. The samples would be analyzed for asbestos. The sample locations would be surveyed, and a sediment sampling report would be prepared.

As discussed further below, while this alternative contemplates installing an engineered cap over areas with asbestos concentrations greater than the PRG, further evaluation of the type of capping material that would be necessary to prevent exposure to human receptors should be conducted prior to implementing this remedy. Therefore, a pre-design study of potential capping materials would be conducted. This study would also include an assessment of potential cover materials that could be installed over the top of the engineered cap. A report summarizing the findings of this study would be prepared. Hence, the design/construction and associated costs described below are considered preliminary in nature, and subject to revision based on the results of these pre-design studies.

During remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place. If so, the cover (or cap) over the remaining wastes will be designed to meet relevant and appropriate hazardous waste standards.

Installation of Cap Material

An engineered cap is proposed for capping of sediments in Lewis Pond. As depicted on Figure 30, some areas that require capping are located beneath the pond; whereas, other areas are located in “wetland” type environments. In either case, the same capping material is proposed.

Sediment sampling to identify where any characteristic hazardous waste is present in Lewis Pond sediments would have to be conducted to determine the specifications of the cap. Prior to initiation of construction activities, silt curtains would be installed to control downstream sediment migration during construction. Prior to capping, those areas that are vegetated would be “grubbed and cleared.” Installation of the cap would include placement of a double-layered fabric “envelope” in the area to be capped. Subsequently, a cement mixture would be pumped into this fabric “envelope.” Woven “filter points” in the fabric “envelope,” allow relief of hydrostatic uplift pressure from underlying groundwater. In areas where capping would occur in “wetland” type environments, a soil and vegetated cover would be placed over the top of the

concrete portion of the cap (if possible-as determined by pre-design studies). Pre-design studies performed as part of the wetlands evaluation would assess what type of cover material would be installed over the concrete portion of the cap. A basic schematic of the proposed engineered cap is presented on Figure 31. Lost flood storage capacity and wetland resources altered by the cap would require mitigation within the waterway.

Deed Restriction, Inspection, and Maintenance of Cap

This action involves preparation of deed restrictions to preclude non-essential disturbance of the engineered cap and underlying sediments with asbestos concentrations greater than the PRG and, potentially, hazardous waste. A component of this deed restriction would include requirements of adhering to the guidelines of a sediment management plan, which would be established for potential essential construction-related activities (e.g., maintenance of the West Street Dam) in capped portions of the Site.

Monitoring of the wetlands would involve three visits: one after the first month, one at the end of the first growing season, and one at the end of the second growing season to assess plant hardiness and mortality.

Quarterly, or potentially more frequent inspections (particularly after major rainfall events) of the capped areas would evaluation of the integrity of the vegetated subaqueous cap. Those areas where vegetation or capping materials appeared compromised would be repaired and/or replaced. There would be yearly monitoring and reporting on compliance with institutional controls.

The SSW-4 alternative also includes a review of Site conditions and risks at five-year intervals and documentation of these conditions in a report. This measure is a statutory requirement of CERCLA that applies to remedial actions in which contaminants remain on-Site.

Clean-up Time-frame

It is estimated that the time necessary to complete the SSW-4 alternative (absent the long-term monitoring and maintenance requirements) would be approximately two to four months from initiation of construction activities. Concentrations of asbestos in Lewis Pond sediment are expected to remain relatively unchanged beneath those areas covered by a cap for greater than 100 years.

4.4.5 Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond

Alternative SSW-5 involves excavation of soil on Lot 33-257 and Lot 33-360, and dredging/excavation of the sediment in the Former Mill Tailrace and Lewis Pond. Excavated soils and dredged/excavated sediments would be disposed off-Site. An itemized cost estimate,

and supporting calculations and assumptions for alternative SSW-5 are presented in Appendix D-4d. Costs are summarized in Table 13D.

The table below summarizes the approximate volumes of sediment in those areas that would be excavated/dredged as part of the SSW-5 remedial alternative. These areas are depicted on Figure 26.

Sediment / Soil Area Designation	COC(s) with Concentrations Higher than PRGs	Assumed Depth of Sediment /Soil COCs greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Lewis Pond Area #1	Asbestos	2	22,000	1,700
Lewis Pond Area #2	Asbestos	2	15,000	1,200
Lewis Pond Area #3	Asbestos	2	9,400	700
Former Mill Tailrace	Asbestos	1	1,200	50
Lot #33-360	Asbestos	1	4,400	200
Lot #33-257	Asbestos/Lead	1	17,000	600

Pre-Excavation Sediment/Soil Sampling and Analysis

To confirm the limits of impacted sediment, a sampling and analysis program is proposed as part of this alternative. In general, three samples (one sample collected from 0 to 1 ft bgs, one sample from 1 to 2 ft bgs, and one sample from 2 to 3 ft bgs) per 400 ft^2 would be collected from each area for a total of approximately 520 samples. The samples would be analyzed for asbestos, and in the case of Lot #33-257, lead and asbestos. Approximately one-half of the samples submitted for laboratory analysis would also be analyzed for moisture content, bulk density, and grain-size distribution to further refine potential excavation and dewatering methods. The sample locations would be surveyed, and a sediment sampling report would be prepared.

Construction and Removal of Temporary Roadways

Some of the areas that require remediation in the SSW-5 alternative are in locations that would require construction of a temporary roadway in order to secure access. The presumed locations of the temporary roads are depicted on Figure 30. Since these roadways would be located primarily on residential properties, it is likely that the roads would need to be removed and the areas restored to their original condition following completion of excavation/dredging activities.

Sediment and Soil Excavation/Dredging and Dewatering

Prior to initiating dredging/excavating activities in the Lewis Pond Area #s 1, 2, and 3, or the Former Mill Tailrace, turbidity curtains would be positioned to limit sediments from migrating downstream during dredging activities. These turbidity curtains would be periodically replaced and/or repositioned as necessary during the dredging process.

Mechanical sediment dredging using a 2 cubic yard clamshell excavator, or similar equipment, is proposed for dredging in Lewis Pond Area #s 1, 2, and 3, and the Former Mill Tailrace. The excavator would move along the perimeter or within the remedial areas and reach into the excavation area to remove the sediment. Water would likely be allowed to drain back into the excavation from the sediment in the clamshell bucket, but the sediment would likely retain a significant amount of water. The amount of water remaining in the dredged sediment prior to dewatering is assumed to be approximately 50 percent by volume on average.

A loader and skid steer would be used to move dredge spoils into roll-off filter containers. Water draining from the sediment would pass through a filter cloth and screen at the bottom of the container and would be pumped to frac tanks for characterization sampling and analysis prior to treatment and off-Site disposal. A hose connected to a vacuum truck could be connected to the bottom of the containers to assist in dewatering the sediment and transferring the water to frac tanks.

Excavation with either an excavator or loader is proposed for sediment/soils on Lots 33-257 and 33-360. Excavation would be performed "in the wet" due to the presence of asbestos in these soils. Soils would be loaded directly into covered roll-off dumpsters for off-Site disposal[25]. Following excavation in these areas, clean backfill material and a vegetated cover (i.e., grass) would be placed to approximately the pre-excavation grades.

Following excavation and dredging, confirmatory sampling and analysis is proposed. Approximately 1 sample per 400 ft^2 from the excavated/dredged areas for a total of 170 samples. The samples would be analyzed for asbestos, and additionally in the case of soils excavated from lot 33-257, lead.

Disposal of Dewatered Sediment/Soil and Water

Limited data are available pertaining to the RCRA hazardous characteristics (e.g., ignitability, corrosivity, reactivity, and toxicity) of sediments/soils excavated as part of this alternative. Because of the relatively limited Site data pertaining to disposal characterization, assumptions have been made regarding the volumes of sediment/soil associated with various disposal categories. In some cases, analytes are present in sediment/soil with concentrations that could indicate these soils are hazardous by characteristic. In general, the "RCRA 20X Rule" has

[25] On-site consolidation and disposal of sediment/soil is likely less cost-effective than off-Site disposal for sediment/soil generated as part of this alternative. Refer to Appendix C for further discussion/evaluation of on-Site versus off-Site disposal of sediment/soil. Potential disposal options will be further evaluated during remedial design; however, for costing purposes, it is assumed that soil/sediment will be disposed off-Site.

been used as a means of conservatively estimating if sediments/soils could be considered hazardous by characteristic when excavated. Excavated sediments/soils would be characterized for waste disposal purposes (i.e., TCLP analyses). In the event that the results of waste characterization indicate that the materials would be deemed hazardous, treatability studies may be completed to develop a suitable mixture of stabilization agents to render the materials non-hazardous on-Site and allow their disposal off-Site as non-hazardous waste, if cost savings would be realized over disposing of the materials off-site as hazardous waste.

It is assumed that dewatered sediment/soil would be sampled at a frequency of 1 sample per 500 tons, or a total of 16 samples for the presumed dewatered sediment/soil quantity of approximately 7,600 tons. Water samples would be collected at a presumed frequency of one sample per frac tank (approximately 21,000 gallons), or a total of 17 samples for the presumed water volume of 360,000 gallons.

Refer to Appendix C for further discussion of categorization of sediment/soil types and estimation of volumes associated with these material types. The table below presents a description of the various sediment/soil types, the volumes of these material types, assumptions regarding the potential for these materials to be deemed characteristically hazardous waste, and whether stabilization may be necessary prior to off-Site disposal.

Remedial Area	Waste Description	Potentially Hazardous Based on "20X Rule"?	Estimated Volume (Cubic Yards unless otherwise indicated)	Stabilization Potentially Necessary Prior to Disposal?
Lewis Pond Area #1	Sediment/soil with asbestos greater than the PRG and lead greater than 100 ppm and/or other metals greater than 20X Rule	Yes	1,700	Yes
Lewis Pond Area #2			1,200	
Lewis Pond Area #3			700	
Former Mill Tailrace			50	
Lot #33-360			200	
Lot #33-257			600	
All Sediment Areas	Water from dewatering sediments	No	360,000 gallons	Not Applicable

Wetlands Restoration

Dredging activities to address sediment contamination would occur within wetland areas. Restoration of wetlands where sediment dredging would occur is therefore a proposed component of this alternative. The success of wetlands restoration would depend in part on the design, which ties the restored and constructed wetlands areas with the existing hydrology of

Lewis Pond or the Former Mill Tailrace. Pre-design investigation activities would be focused on obtaining the data needed to achieve this goal. Prior to sediment dredging, further characterization of soils, vegetation, and hydrology would be performed. A wetland functional assessment would be conducted to assess the existing functions and values of the wetland.

Restoration of wetlands within the sediment dredging areas would be accomplished by post-dredging grading, importing wetland soils, planting wetlands vegetation, and modifying surface water flow patterns so that the restored area receives adequate water.

Monitoring of the wetlands would involve three visits: one after the first month, one at the end of the first growing season, and one at the end of the second growing season to assess plant hardiness and mortality.

Clean-up Time-frame of SSW-5 Alternative

It is estimated that the time necessary to complete the SSW-5 alternative would be approximately 4 to 6 months from initiation of road construction activities, not inclusive of post-remediation monitoring of constructed wetlands.

5.0 DETAILED ANALYSIS OF ALTERNATIVES

The remedial alternatives assembled and described in Section 4.0 are analyzed in detail in this section. The detailed analysis of alternatives is intended to provide sufficient information to compare the alternatives and facilitate selection of a specific remedy for the Site. The analysis focused on nine evaluation criteria, which encompass statutory requirements, as well as technical, cost, and institutional considerations, which are considered appropriate for a thorough evaluation

5.1 Evaluation Criteria

Nine evaluation criteria have been developed to provide the basis for conducting the detailed analysis of remedial alternatives and for subsequently selecting an appropriate remedial action. These criteria are prescribed in the NCP under 40 C.F.R. § 300.403(e)9(iii) and further described in the USEPA guidance document (USEPA, 1988). The nine evaluation criteria are:

- Overall Protection of Human Health and the Environment;
- Compliance with ARARs;
- Long-term Effectiveness and Permanence;
- Reduction of Toxicity, Mobility, and/or Volume through Treatment;
- Short-term Effectiveness;
- Implementability;
- Cost;
- State Acceptance; and
- Community Acceptance.

The first two criteria listed above (i.e., Overall Protection of Human Health and the Environment, and Compliance with ARARs) are “threshold” criteria, in that they relate directly to statutory findings that must ultimately be made in the ROD, and therefore they must be satisfied in order for an alternative to be selected. The next five criteria represent the primary “balancing” criteria upon which the comparative analysis of alternatives is based. The final two evaluation criteria, state acceptance and community acceptance, represent modifying criteria, which will be considered in the comparative analysis of alternatives and fully assessed following public comment on the FS report and the proposed plan.

Brief descriptions of the evaluation criteria are provided below:

5.1.1 Overall Protection of Human Health and the Environment

This evaluation criterion assesses whether the alternative provides adequate protection of human health and the environment (i.e., ecological receptors). Specifically, the evaluation of overall protectiveness will describe how Site risks are eliminated, reduced, or controlled through removal/treatment, engineering actions, or institutional controls.

5.1.2 Compliance with ARARs

The evaluation under this criterion addresses if/how each alternative would meet Federal and State ARARs identified in earlier stages of the FS. The detailed analysis summarizes how the alternatives meet ARARs, or provides a basis for justifying a waiver when an ARAR would not be met.

5.1.3 Long-Term Effectiveness and Permanence

The evaluation addresses the alternative in terms of the risk remaining at the Site posed by treatment residuals and/or untreated media. This criterion consists of two components:

- Magnitude of residual risk – This component addresses the residual risk associated with treatment residuals or untreated media remaining at the Site at the conclusion of remedial activities (e.g., after soil containment and/or treatment are complete).

- Adequacy and reliability of controls – This component addresses the adequacy, suitability, and long-term reliability of physical and/or institutional controls, if any, which are used to provide continuous protection from residuals or untreated media that remain at the Site.

5.1.4 Reduction of Toxicity, Mobility and/or Volume Through Treatment

The evaluation addresses the statutory preference for the selection of alternatives that utilize treatment technologies that permanently and significantly reduce toxicity, mobility, and/or volume of the Site contaminants. This evaluation focuses on the following specific factors:

- The treatment process(es) utilized and the materials they would treat;
- The amount of hazardous materials (if present) or contaminated media that would be destroyed or treated;
- The degree of anticipated reduction in toxicity, mobility, and/or volume;
- The degree to which the treatment would be permanent and irreversible;
- The type and quantity of treatment residuals that would remain; and
- Whether the alternative would satisfy the statutory preference for treatment as a primary element of the alternative.

5.1.5 Short-Term Effectiveness

The evaluation under this criterion addresses the effects of the alternative on human health and the environment during construction and implementation. The following factors are addressed as appropriate:

- Protection of the community during remedial actions – Potential risks resulting from implementation of the alternative are considered, such as dust from excavation, or truck traffic due to transportation of contaminated media to off-Site facilities.

- Protection of workers during remedial actions – Potential risks to workers resulting from implementation of the remedial actions are considered, such as contact with hazardous materials, and the effectiveness and reliability of protective measures that would be required.

- Environmental impacts during remedial actions – Risks to the environment resulting from implementation are considered, such as erosion and sediment transport, and the effectiveness and reliability of mitigation measures that would be available.

- Time until achievement of remedial action objectives – Estimates of the time required to achieve the intended remedial objective for the Site as a whole, or individual media categories or Site areas are considered.

5.1.6 Implementability

The evaluation of implementability addresses the following factors:

- Technical feasibility – The feasibility of a remedial technology is considered in terms of construction and operation difficulties and unknowns, reliability, ease of undertaking additional remedial action, if any may be required, and monitoring considerations.

- Administrative feasibility – Administrative issues, such as ability to achieve permit standards for construction and operation are considered.

- Availability of services and materials – The availability of services and materials required to implement an alternative, such as off-Site treatment/disposal facilities or personnel/equipment for on-Site treatment are considered.

5.1.7 Cost

The final balancing criterion considers relative cost estimates for each alternative. The cost estimates are preliminary 'engineer's estimates' and represent opinions of the costs associated with implementing each alternative, and are not equivalent to an estimate that a remedial contractor would bid or professional cost estimator may provide after remedial design is

completed and construction documents, if warranted, are prepared. The cost estimates attempt to achieve an accuracy of +50 percent to –30 percent and include the following components:

- Capital Costs – Consist of 'direct' and 'indirect' capital costs. Direct costs may include equipment, materials, labor, transportation and disposal. Indirect costs may include engineering, startup and shakedown, and contingencies.

- Annual O&M Costs – Consist of post-construction costs necessary to maintain the on-going effectiveness of the remedial action, and may include labor, materials (e.g., replacement parts, treatment chemicals), treatment residuals treatment/disposal, energy/utilities, compliance monitoring, administration, and insurance.

- Periodic Costs – Include costs for five-year reviews, treatment system decommissioning/disposal at completion of remedial activities, monitoring well abandonment at completion of monitoring activities, and other costs, which are not considered capital or annual O&M.

- Present Value Analysis – Costs are evaluated on the basis of a single value that represents the amount of money that, if invested in the base or current year and disbursed as needed, would be sufficient to fund expenditures associated with the alternative over its lifetime. In calculating the present worth of the alternatives, a discount rate of 7 percent is used in accordance with Office of Solid Waste and Emergency Response (OSWER) Directive No. 9355.3-20, dated June 25, 1993, and USEPA (2000b).

5.1.8 State Acceptance

Technical or administrative issues and concerns the Commonwealth of Massachusetts (specifically the MassDEP) may have regarding each alternative were considered during preparation of this FS, including the identification of ARARs, or the proposed use of waivers. The MassDEP has provided input to the RI/FS process on an on-going basis. As a result, additional discussion about State acceptance is not included in this FS. State acceptance will be further considered in the Record of Decision, for which MassDEP is expected to issue a concurrence letter.

5.1.9 Community Acceptance

Public concerns will likely be addressed after the public comment period, and will be incorporated into a "Responsiveness Summary" after comments on the RI and FS reports, and Proposed Plan are received. As such, additional discussion regarding community acceptance is not presented herein.

The detailed analysis is presented in the following Sections. Consistent with USEPA guidance, the detailed analysis of alternatives includes an individual analysis of alternatives, followed by a comparative analysis of alternatives. The individual analysis of alternatives includes "an assessment and a summary profile of each alternative against the evaluation

criteria." The comparative analysis of alternatives consists of "a comparative analysis among the alternatives to assess the relative performance of each alternative with respect to each evaluation criteria." Sections 5.2 through 5.9 present our detailed analysis of alternatives.

5.2 Individual Analysis of the SW Alternatives

An individual analysis of SW alternatives is presented in Table 14A.

5.3 Comparative Analysis of the SW Alternatives

The table below presents a qualitative summary of the results of the comparative analysis of SW alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to this table for a "big picture" understanding of a comparison of the SW alternatives.

Comparative Analysis Summary of SW Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effective-ness	Implement-ability	Cost
SW-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
SW-2	Limited Action	**N**	**N**	**P**	**N**	**Y**	**P**	**M**
SW-3	Groundwater Collection and Treatment	**Y**	**Y**	**Y**	**P**	**Y**	**P**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.
2) "**Y**" Meets Criterion
   "**P**" Partially Meets Criterion
   "**N**" Does Not Meet Criterion
   "**L**" Low Cost
   "**M**" Medium Cost
   "**H**" High Cost

5.3.1 Overall Protection of Human Health and the Environment

Alternative SW-1 is not protective of human health or the environment, as no measures would be implemented to preclude access/exposure to Site groundwater, or surface water in the Former Mill Tailrace. There also would be no measures to protect human health or the environment from exposure to contaminated groundwater within the SO and AOC waste management areas.

Alternative SW-2 is protective of human health as it relies entirely upon long-term monitoring, institutional controls, and fencing to preclude access/exposure to contaminated groundwater and surface water. Surface water institutional controls would include prohibiting wading in the Former Mill Tailrace by deed restriction, and access would be restricted by installing and maintaining a fence around this area. Groundwater institutional controls would also establish compliance boundaries around the SO and AOC waste management areas. Within these boundaries groundwater use restrictions would prevent exposure to contaminated groundwater. Furthermore, long-term monitoring would ensure contaminated groundwater was not migrating beyond the compliance boundaries. However, SW-2 includes no measures that are protective of the environment. Under this alternative, water quality (particularly pH) in the Mill Tailrace would still exceed regulatory standards for protecting aquatic life.

Alternative SW-3 relies upon capturing contaminated groundwater upgradient of the Former Mill Tailrace via a groundwater collection trench. Captured groundwater would be treated and discharged to the Former Mill Tailrace. Hence, potential human health risks from exposure to high pH surface water in the Former Mill Tailrace are addressed by eliminating the source of contamination. Ecological protection standards would also be achieved by intercepting and treating the contaminated groundwater before it discharges into the Mill Tailrace, since removing the source of contamination will restore water quality for ecological receptors. As with alternative SW-2, groundwater institutional controls would also establish compliance boundaries around the SO and AOC waste management areas. Within these boundaries, groundwater use restrictions would prevent exposure to contaminated groundwater. Furthermore, long-term monitoring would ensure contaminated groundwater was not migrating beyond the compliance boundaries. The permanence and reliability of controls to prevent human health risks will be further discussed in Section 5.3.6. Alternative SW-3 is the only alternative that is protective of both human health and the environment.

5.3.2 Compliance with ARARs

Alternative SW-1 would not achieve chemical-specific ARARs, as exceedances of state and federal surface water quality standards would remain in the Former Mill Tailrace. Alternative SW-1 has no location- or action-specific ARARs

Alternative SW-2 would not achieve chemical-specific ARARs, pertaining to state and federal surface water quality standards within the Former Mill Tailrace, since the source of contaminated groundwater into the Tailrace would not be addressed. Groundwater chemical-

specific standards within the compliance boundaries for the SO and AOC waste management areas would be achieved by institutional controls and long-term monitoring.

Alternative SW-2 would not achieve location-specific ARARs, pertaining to protecting wetland and floodplain resources since it would permit contaminated groundwater to discharge into surface waters, wetland, and floodplain. The remedial actions proposed under SW-2, institutional controls and long-term monitoring can be conducted in compliance with action-specific ARARs.

Alternative SW-3 meets surface water standards established by the chemical-specific ARARs by remediation of groundwater that would cause exceedances of ARARs in the Former Mill Tailrace. In SW-3, migration of contaminated groundwater to the Former Mill Tailrace is prevented by groundwater extraction and treatment. Groundwater chemical-specific standards within the compliance boundaries for the SO and AOC waste management areas would be achieved by institutional controls and long-term monitoring.

The remedial actions to be carried out under alternative SW-3, including installation and maintenance of monitoring wells and the groundwater collection trench at the Former Mill Tailrace, would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs listed on Table 12A, including coordination with appropriate regulatory agencies, where necessary. Alternative SW-3 would involve construction and maintenance activities in wetlands, floodplains, and/or surface water bodies in the Former Mill Tailrace area and/or the compensatory wetland area. These activities would be completed in a manner that addresses potential impacts to wetlands, floodplains, surface water bodies and potential historic resources. Under applicable wetland standards, this alternative is the least damaging practicable alternative to protecting wetland resources since it will remediate contaminated groundwater which is altering wetland resources.

Alternative SW-3 will meet all action-specific ARARs, both those pertaining to the installation, operation, and maintenance of the groundwater collection trench and treatment system at the Former Mill Tailrace and those pertaining to the establishment of institutional controls and long-term monitoring to address the contaminated groundwater within the SO and AOC waste management areas.

5.3.3 Long-Term Effectiveness and Permanence

Alternative SW-1 would provide no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent.

Alternatives SW-2 and SW-3 both rely on institutional controls to remove human health groundwater risks by precluding exposure to contaminated groundwater within the compliance boundaries of the SO and AOC waste management areas. Furthermore, long-term monitoring ensures groundwater contamination does not migrate beyond the compliance boundaries. When properly established and implemented, institutional controls, with long-term monitoring, would provide adequate, permanent, and reliable measures for long-term and effective

permanence of the groundwater remedy, particularly when combined with yearly institutional control compliance monitoring, quarterly inspections, and five-year reviews. However, alternative SW-2 does not achieve surface water RAOs since it does not address remediation of contaminated groundwater which is degrading surface waters within the Former Mill Tailrace.

The groundwater collection and treatment system in alternative SW-3 is estimated to achieve surface water RAOs in less than one month from system startup, or approximately two to four months from initiation of construction activities for the groundwater collection and treatment system.

SW-3 requires long-term (potentially greater than 100 years) operation and maintenance of both the groundwater collection and treatment system and the groundwater monitoring system for the SO and AOC waste management areas. Institutional controls will need to be maintained for the life of the remedy.

5.3.4 Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives SW-1 and SW-2 provide no reduction of toxicity, mobility, or volume through treatment, as no active remedial measures to reduce the mass of contamination would be implemented.

Alternative SW-3 partially meets this criterion, as approximately 5.3×10^8 gallons of contaminated groundwater, that currently discharges into the Former Mill Tailrace would be collected and treated over a period of approximately 100 years to prevent its degradation of surface water quality. The operation of the groundwater collection and treatment system would produce treatment residuals (e.g., wastewater treatment sludge, spent granular activated carbon [GAC]) that would require off-Site treatment/disposal. Alternative SW-3 would not treat the remaining contaminated groundwater within the compliance zones of the SO and AOC waste management areas.

5.3.5 Short-Term Effectiveness

The implementation of alternatives SW-1 and SW-2 is not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions. Risks to workers performing monitoring, well repair/installation, fence repair, quarterly inspections, and 5-year reviews as part of SW-2 can be controlled and mitigated with proper health and safety measures.

Alternative SW-3 involves a degree of construction/excavation/backfilling activities. These activities may potentially generate fugitive dust, which could contain asbestos. These emissions would be controlled by engineering controls such as wetting. Workers may also be exposed to high pH groundwater. Risks to workers can be controlled and mitigated with proper health and safety measures.

Implementation of SW-3 would reduce groundwater flow conditions to the Former Mill Tailrace, which contains surface water and wetlands. However, discharge of treated groundwater to the Former Mill Tailrace would directly provide additional surface water flow to this area.

Alternative SW-1 would likely require greater than approximately 100 years to achieve groundwater and surface water RAOs. Alternative SW-2 would also not achieve surface water RAOs for more than 100 years. Furthermore, groundwater contamination within the compliance zones of the SO and AOC waste management areas would remain for greater than 100 years.

Alternative SW-3 would achieve surface water RAOs in a relatively short timeframe (less than two to four months) from implementation of the alternative. The controls (groundwater collection and treatment system) associated with alternative SW-3 would need to be operated for 100 years to prevent surface water RAOs from being exceeded. Groundwater contamination within the compliance zones of the SO and AOC waste management areas would remain for greater than 100 years.

5.3.6 Implementability

Alternative SW-1 involves no remedial actions, other than conducting Five-Year Reviews; therefore, this alternative is easily implemented and additional actions or monitoring could be readily undertaken.

The proposed technologies for alternatives SW-2 and SW-3 are generally easily constructed, and are proven and reliable. In general, additional actions could be readily undertaken, and the effectiveness of the alternatives could be easily monitored through groundwater or surface water monitoring, institutional control compliance monitoring, quarterly inspections, and five-year reviews. Personnel, equipment, and materials are generally available for all of these technologies, and the technologies are well established. For alternative SW-3, the availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment (i.e., generated as part of groundwater extraction trench excavation for SW-3) in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment.

The SW-3 alternative is generally reliable, as it would be completed with proven reliable methods.

Administrative tasks associated with SW-2 and SW-3 would involve coordination with various regulatory authorities to provide for the protection of wetland and aquatic resources, and limit negative impacts to the extent practicable. The establishment of groundwater institutional controls to address the groundwater contamination within the areas of the SO and AOC waste management areas, as well as continued access to the Site for the SW-2 and SW-3 alternatives require the cooperation of affected property owners. Depending on the precise nature of the

institutional controls, regulatory action, such as enactment of local By-Laws, may also be required.

5.3.7 Cost

The costs for the SW alternatives are summarized in Table 13A. Alternative SW-1 would have limited costs associated with conducting Five-Year Reviews.

Alternative SW-2 would have limited costs associated with establishing and maintaining institutional controls and long-term monitoring, as well as Five-Year Reviews.

Alternative SW-3 has higher overall, capital, and O&M costs as compared to SW-1 and SW-2. This is due in large part to the construction of a relatively complex groundwater collection and treatment system, and on-going operation and maintenance costs associated with the groundwater collection and treatment system contemplated as part of SW-3.

It should be noted that depending on how the SW, SO, AOC, SSW alternatives are combined to form comprehensive Site-wide alternatives, there may be some redundancy in tasks/costs (generally relatively minor - e.g., excavation of the Former Mill Tailrace, fencing, institutional controls, Site inspections, etc.) that would result in the cost for the implementation of the combined alternatives being slightly less than the sum of alternatives individually.

5.4 Individual Analysis of the SO Alternatives

An individual analysis of SO alternatives is presented in Table 14B.

5.5 Comparative Analysis of the SO Alternatives

The table below presents a qualitative summary of the results of the comparative analysis of SO alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to this table for a “big picture” understanding of a comparison of the SO alternatives.

Comparative Analysis Summary of SO Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effective-ness	Implement-ability	Cost
SO-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
SO-2	Limited Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**M**

Comparative Analysis Summary of SO Alternatives								
SO-3	Vapor Mitigation and Soil Cap	**N**	**N**	**N**	**P**	**Y**	**Y**	**M**
SO-4	Limited Excavation	**N**	**N**	**N**	**P**	**Y**	**Y**	**L**
SO-5	Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**H**
SO-6	Comprehensive Excavation and Off-Site Disposal	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.
2) "**Y**" Meets Criterion
   "**P**" Partially Meets Criterion
   "**N**" Does Not Meet Criterion
   "**L**" Low Cost
   "**M**" Medium Cost
   "**H**" High Cost

5.5.1 Overall Protection of Human Health and the Environment

As described in Section 2, there are no "actionable" ecological risks at the Site; therefore, an assessment of protection of the environment is unnecessary for the SO alternatives. In addition, there are no "actionable" human health risks to current receptors in this portion of the Site; therefore, remedial measures proposed as part of the SO alternatives are aimed at preventing risk to hypothetical future receptors from exposure to contaminated soil and soil vapors. Human health risks from contaminated groundwater under the area are addressed under the SW alternatives.

Alternative SO-1 is not protective of human health, because no measures would be taken to prevent ingestion/dermal contact with soil that has COC concentrations greater than PRGs, or inhalation of indoor air impacted by unacceptable levels of TCE from soil/soil vapor.

Alternatives SO-2 through SO-6 all rely upon institutional controls and long-term monitoring as part of the remedial alternative; however, the protectiveness level of the institutional controls varies with each alternative. The table below summarizes the type of institutional control that would be implemented for the SO-2 through SO-6 alternatives.

Summary of Key Components of Institutional Controls for SO-2 Through SO-6 Alternatives						
Alternative Designation	**Requires Maintenance of Fencing and Prevents Future Development in Area of TCE Impacts**	**Requires Maintenance of Existing Asphalt or Soil Cover**	**Prohibit "Daycare Age Child" Development" (Current Allowed Use)**	**Prohibit Residential Use**	**Requires Compliance with a Soil Management Plan**	**Requires Maintenance of Newly Installed Asphalt or Soil Cover**
SO-2: Limited Action	X	X	X	X	X	
SO-3: Vapor Intrusion Mitigation and Covering of Soils Contaminated with Asbestos and PAHs		X	X	X	X	
SO-4: Limited Excavation			X	X	X	
SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils				X	X	X
SO 6: Comprehensive Excavation and Off-Site Disposal				X	X	X

Common to alternatives SO-2 through SO-6 are long-term monitoring and institutional controls precluding residential development, and requiring compliance with a soil management plan.

Alternatives SO-2, SO-3, and SO-4 are not protective of the current allowed use for the SO area, which includes use for child daycare or school facilities. Alternatives SO-2, SO-3, and SO-4 only would be protective of a construction worker in the SO area. Furthermore, alternative SO-2 relies solely on access restrictions and does not result in any contamination being removed from the site. Alternative SO-3 actively removes soil vapor risks, but does not address soil contamination, except through access restrictions and monitoring. Alternative SO-4 is somewhat more protective since some contaminated soils would be removed, however soils contaminated with hazardous waste may be left on site.

Alternative SO-5 would be protective for the current allowed uses of the site if replacement cover material can prevent access to subsurface, contaminated soil.

The remedial measures implemented as part of SO-6 would provide the greatest degree of protection to human health, and would allow the least restrictive form of institutional control of the six alternatives, as excavation of soils with COCs greater than PRGs would be performed. Alternative SO-6 would require long-term maintenance of institutional controls.

5.5.2 Compliance with ARARs

Alternative SO-1 will not achieve chemical-specific ARARs, since risks posed by site contaminants will not be addressed. There are no location- or action-specific ARARs for this alternative.

Alternative SO-2 does not meet chemical-specific ARARs since currently permitted uses (including childcare facilities) would be subject to unacceptable risk levels. The alternative would meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. Furthermore, to the extent that hazardous waste is present in the contaminated soil, the institutional controls alone called for in alternative SO-2 do not meet relevant and appropriate action-specific ARARs pertaining to the management of hazardous waste.

Alternatives SO-3 and SO-4 do not meet chemical-specific ARARs since currently permitted uses (including childcare facilities) would be subject to unacceptable risk levels. Alternatives SO-3 and SO-4 will meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. To the extent the limited excavations and maintenance of the existing cover in alternatives SO-3 and SO-4 do not remove all hazardous waste on site, the alternative will not meet action-specific ARARs pertaining to the management of hazardous waste. Additional action-specific standards pertaining to monitoring, excavation and disposal of non-hazardous wastes will be met.

Alternative SO-5 will meet all chemical-specific ARARs since currently permitted uses (including childcare facilities) would not be subject to unacceptable risk levels. SO-5 will meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. Alternative SO-5 would be designed to meet action-specific ARARs pertaining to the management of hazardous waste if either all hazardous waste is removed with the excavation or if the cover meets relevant and protective standards under the ARARs. Additional action-specific standards pertaining monitoring, excavation and disposal of non-hazardous wastes will be met. During remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place. If so, the cover (or cap) over the remaining wastes will be designed to meet relevant and appropriate hazardous waste standards.

Alternative SO-6 will meet all chemical-specific ARARs since currently permitted uses (including childcare facilities) would not be subject to unacceptable risk levels. SO-6 will meet all location-specific ARARs pertaining to the protection of adjacent wetlands and potential historic resources. Alternative SO-6 will meet all action-specific ARARs for the management of hazardous, asbestos, and non-hazardous waste.

5.5.3 Long-Term Effectiveness and Permanence

Alternative SO-1 would provide no risk reduction from baseline conditions for hypothetical future receptors under this alternative. Therefore, this alternative is neither effective, nor permanent.

Alternative SO-2 offers the least long-term effectiveness and permanence of the action alternatives, as it relies upon institutional controls and maintenance of the existing asphalt cover or soil cover, and newly installed fence to protect future receptors.

Alternative SO-3 would address asbestos- and TCE-impacted soil or soil vapor by: maintenance of the asphalt cover over asbestos-impacted soils, and installation and operation of a horizontal barrier and sub-slab depressurization system beneath any future building constructed in the area of TCE-impacted soil, all of which are well-proven and reliable technologies. These potential risks would be addressed immediately upon implementation of these measures. However, in order to maintain long-term effectiveness and permanence of the remedy, the sub-slab depressurization system would need to be operated potentially for up to approximately ten years, and the maintenance of the asphalt cover would be required for greater than 100 years, hence this alternative is deemed less effective and permanent than alternatives SO-4, SO-5 and SO-6.

Alternatives SO-2, SO-3, and SO-4 each would only partially achieve long-term effectiveness and permanence since contaminated soils would remain in place that would continue to pose an unacceptable risk for current uses of the site.

Alternatives SO-5 and SO-6 would achieve the highest degree of long-term effectiveness and permanence, as risks would be addressed by excavation with off-Site disposal and installation

and maintenance of a cover over contaminated soils left in place. Excavation is a well-proven and highly reliable means of addressing soil contamination. Alternative SO-6 is more effective and permanent than alternative SO-5, since more material exceeding PRGs will be removed from the site. The SO-5 and SO-6 alternatives would each be completed in approximately one to two months. SO-5 would require on-going maintenance of the asphalt or soil cover for greater than 100 years. SO-6 would require long-term maintenance of institutional controls.

5.5.4 Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives SO-1 and SO-2 provide no reduction of toxicity, mobility, or volume through treatment, as no active remedial measures to reduce the mass of soil contamination would be implemented.

Alternative SO-3 partially meets this criterion, as contaminated soil vapor would be collected to prevent migration of TCE into indoor air (it is estimated that approximately 10 pounds of TCE would be removed over the anticipated 10-year operational timeframe of the sub-slab depressurization system). However, asbestos-impacted soils would remain in place under the existing asphalt cover, and PAH-, lead-, and arsenic-impacted soils would not be treated as part of the remedy.

Alternative SO-4, SO-5 and SO-6 would reduce the toxicity, mobility, and volume of contaminants on-Site through stabilization of contaminated soil before it is disposed of off-Site. The amount of soil stabilized varies between the alternative depending on the quantity of soil to be excavated and the requirements of the off-site disposal facility. Alternative SO-4 would involve the stabilization of approximately 130 cubic yards of TCE- or asbestos-impacted soil. Alternative SO-5 would involve the stabilization of approximately 2,030 cubic yards of TCE-, asbestos-, PAH-, and/or arsenic-impacted soil. Alternative SO-6 would involve the stabilization of approximately 2,800 cubic yards of TCE-, asbestos-, PAH-, and/or arsenic-impacted soil. The degree to which alternatives SO-4, SO-5 and SO-6 would satisfy the statutory preference for treatment would depend upon the quantity of contaminated soil stabilized on site prior to off-site disposal.

5.5.5 Short-Term Effectiveness

The implementation of alternative SO-1 is not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions.

Risks to workers performing monitoring, soil vapor implant installation, soil vapor sampling, fence repair, quarterly inspections, and 5-year reviews as part of SO-2 can be controlled and mitigated with proper health and safety measures.

Alternatives SO-3, SO-4, SO-5, and SO-6 involve varying degrees of construction/ excavation/ backfilling activities. These activities may potentially generate fugitive dust and/or vapor emissions. These emissions would be controlled by engineering controls such as wetting, particularly if asbestos-impacted soils were excavated, as proposed in alternatives SO-4, SO-5,

and SO-6. In addition, transporting soil in covered roll-off containers or trucks, and shipment of partially wet soil to the off-Site disposal facility could also be implemented. Risks to workers performing construction, soil excavation/backfilling, monitoring, soil vapor implant installation, sub-slab depressurization system maintenance, quarterly inspections, and 5-year reviews as part of SO-3, SO-4, SO-5 and/or SO-6 can be controlled and mitigated with proper health and safety measures. Alternative SO-3 would involve venting exhaust from the sub-slab depressurization system to the atmosphere. The community and workers would be protected from this exhaust by venting it above the normal breathing zone (as is typical of venting when total VOC concentrations are expected to be relatively low).

Measures implemented as part of the SO-3, SO-4, SO-5, and SO-6 alternatives are not expected to engender adverse ecological or environmental impacts.

5.5.6 Implementability

Alternative SO-1 would involve no remedial actions, other than Five-Year Reviews; therefore, the alternative is easily implemented.

Alternative SO-2 would involve limited remedial actions, including implementing and monitoring institutional controls and long-term monitoring of contaminant levels which should be easily implemented. If necessary, additional actions or monitoring could be readily undertaken.

The proposed technologies for alternatives SO-3, SO-4, SO-5, and SO-6 are generally easily constructed and are proven reliable. There are several facilities that could accept the quantities of TCE-, PAH-, and/or arsenic-impacted soils that would require off-Site disposal under these alternatives. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil. In addition, for all of these four alternatives implementing and monitoring institutional controls and long-term monitoring of contaminant levels should be easily implemented. The personnel, materials, and technologies that would be implemented as part of these alternatives are generally available.

Additional actions could be readily undertaken for alternatives SO-4, SO-5, and SO-6; however, additional action to address TCE-impacted soil under the SO-3 alternative could be difficult (if necessary) due to the presence of a newly constructed building over these soils.

Confirmatory soil sampling for the SO-4, SO-5, and SO-6 alternatives, soil vapor and indoor air sampling as part of the SO-3 alternative, and long-term monitoring, quarterly inspections and five year reviews for SO-2 through SO-6, would allow for assessment of the adequacy of these remedial alternatives.

5.5.7 Cost

The costs for the SO alternatives are summarized in Table 13B. The only cost of alternative SO-1 is the cost to conduct Five-Year Reviews.

Alternative SO-4 has lower capital costs, and hence lower total costs than alternatives SO-2, SO-3, SO-5, and SO-6.

Alternative SO-5 is more expensive than SO-4 due to higher capital costs due to the additional soils that would be excavated and disposed off-Site and the installation of a soil and asphalt cover as proposed in the SO-5 alternative, and the higher O&M costs associated with maintenance of the soil and asphalt covers. Similarly, SO-6 is the highest cost alternative since it removes the most contaminated soil. However, this additional cost is partially offset, since soil and asphalt covers requiring O&M costs are assumed to be unnecessary due to the removal of additional contaminated soil.

5.6 Individual Analysis of the AOC Alternatives

An individual analysis of AOC alternatives is presented in Table 14C.

5.7 Comparative Analysis of the AOC Alternatives

The table below presents a qualitative summary of the results of the comparative analysis of AOC alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to this table for a “big picture” understanding of a comparison of the AOC alternatives.

Comparative Analysis Summary of AOC Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Effective-ness	Implement-ability	Cost
AOC-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
AOC-2	Limited Action	**P**	**P**	**P**	**N**	**Y**	**Y**	**L**
AOC-3	Maintain Cover on AOC, Excavate Settling Basin #2 Containment Cell	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**M**
AOC-4	Excavate AOC and Settling Basin #2 Containment Cell	**Y**	**Y**	**Y**	**P**	**N**	**P**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.
2) "**Y**" Meets Criterion
   "**P**" Partially Meets Criterion
   "**N**" Does Not Meet Criterion
   "**L**" Low Cost
   "**M**" Medium Cost
   "**H**" High Cost

5.7.1 Overall Protection of Human Health and the Environment

While there is not risk to current human or ecological receptors from soils in the AOC due to the soil and asphalt cover and institutional controls, it is acknowledged that in the absence of maintaining the soil and asphalt cap and maintenance of current institutional controls, risk to human health and ecological receptors would likely be predicted. Therefore, alternative AOC-

1 is not protective of human health or the environment because no measures would be taken to preclude exposure to contaminated soils in the AOC.

Alternatives AOC-2 and AOC-3 rely upon institutional controls and the existing soil and asphalt cover to preclude exposure to contaminated soils by human or ecological receptors. Alternative AOC-2 includes establishment of institutional controls that require maintenance of the soil and asphalt covers, soil management standards for areas under the buildings adjacent to the covered areas, maintenance of the culvert, and maintenance of the fence surrounding the AOC. Alternative AOC-3 includes these same institutional controls plus excavation and off-site disposal of contaminated soils in the Settling Basin #2 Containment Cell. Both alternatives AOC-2 and AOC-3 would require long-term monitoring of contaminated soil left in place.

Alternative AOC-4 provides protection of human health and the environment by excavation of contaminated soils, soil management standards for areas under the buildings adjacent to the covered areas, removal of the culvert, backfilling the excavations, and re-establishing the Neponset River bank, with establishment of institutional controls to prevent disturbing contaminated soils beneath the water table. Long-term monitoring of contaminated soil left in place would be required.

Contaminated groundwater beneath the AOC waste management area is to be addressed under the SW alternatives.

5.7.2 Compliance with ARARs

Alternative AOC-1 will not achieve chemical-specific ARARs, since long-term risks would not be addressed through any remedial action under this alternative.

Alternative AOC-2 may comply with chemical-, action-, and location-specific ARARs, as long as any hazardous waste within the Settling Basin #2 Containment Cell is addressed in compliance with all applicable and relevant and appropriate standards.

Alternatives AOC-3 and AOC-4 would comply with chemical-, action-, and location-specific ARARs. However, in the case of AOC-4, significant effort would be required to comply with the substantive requirements of the location- specific ARARs such as preventing /limiting impacts to wetlands, surface water bodies, floodplains, etc. Similarly, significant effort would be required to comply with the substantive requirements of the action-specific ARARs for AOC-4 such as: CWA standards associated with discharge of water to a surface water body (during diversion of the Neponset River); closure and erosion protection related to maintaining the cap (which would be installed after excavation); and hazardous waste standards in the event that hazardous waste would be generated. In addition, extensive measures would be necessary to appropriately handle the substantial amount of asbestos-containing media that would be removed as part of this alternative, which would require careful attention in order to limit inhalation of fugitive dust containing asbestos by workers and members of the community.

5.7.3 Long-Term Effectiveness and Permanence

Alternative AOC-1 would provide no risk reduction from baseline conditions. Therefore, this alternative is neither effective, nor permanent.

The AOC-2 alternative would rely wholly on institutional controls to prevent potential risks. Contaminated soils contained within the soil and asphalt cover portions of the AOC would remain on-Site for greater than 100 years. However, when properly established and implemented, institutional controls provide adequate, and reliable measures for long-term effective remedies, particularly when combined with long-term monitoring, quarterly inspections, and five-year reviews.

AOC-3 would include excavation of the Settling Basin #2 Containment Cell, and implementation of institutional controls to preclude disturbance of the soil and asphalt covers within the AOC as well as establish soil management procedures for under buildings adjacent to the covers. Excavation and off-Site disposal of the contaminated soils located in the Settling Basin #2 Containment Cell is a highly reliable means for addressing such soils from the Site. However, contaminated soil would remain in place above and below the water table. It may take approximately two to four months to excavate the Settling Basin #2 Containment Cell. Contaminated soils in the soil- and asphalt-covered portions of the AOC would remain on-Site for greater than 100 years. However, when properly established and implemented, institutional controls provide adequate and reliable measures for long-term effective remedies, particularly when combined with long-term monitoring, quarterly inspections, and five-year reviews.

Alternative AOC-4 would provide the highest degree of protection and the least residual risk of the AOC alternatives, as contaminated soils above the water table in the AOC would be excavated and disposed off-Site. Excavation and off-site disposal is a highly reliable means for removing contaminated soils from the Site. However, contaminated soil would remain below the water table. It is anticipated that this alternative would take approximately six months to 12 months to complete. Contaminated soils below the water table and under buildings would remain for greater than 100 years. However, when properly established and implemented, institutional controls provide adequate and reliable measures for long-term effective remedies, particularly when combined with long-term monitoring, quarterly inspections, and five-year reviews.

5.7.4 Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives AOC-1 and AOC-2 provide no reduction of toxicity, mobility, or volume through treatment as no active remedial measures to reduce the mass of soil contamination would be implemented.

Alternatives AOC-3 and AOC-4 would reduce the toxicity, mobility, and volume of contaminants on-Site through stabilization of contaminated soil before it is disposed of off-Site. The amount of soil stabilized varies between the alternative depending on the quantity of soil to be excavated and the requirements of the off-site disposal facility. Alternative AOC-3

would involve the stabilization of approximately 1,900 cubic yards of contaminated soil. Alternative AOC-4 would involve the stabilization of approximately 19,000 cubic yards of contaminated soil. The degree to which alternatives AOC-3 and AOC-4 would satisfy the statutory preference for treatment would depend upon the quantity of contaminated soil stabilized on site prior to off-site disposal.

5.7.5 Short-Term Effectiveness

The implementation of alternative AOC-1 is not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions, since the only action under this alternative, conducting Five-Year Reviews, should not pose any risks.

Alternative AOC-2 is also not anticipated to pose additional risks or impacts to the community or the environment, since remedial actions are limited to establishing and maintaining institutional controls and long-term monitoring. Risks to workers performing fence repair, soil and asphalt cover maintenance, long-term monitoring, quarterly inspections, and 5-year reviews as part of AOC-2 could be controlled and mitigated with proper health and safety measures.

The AOC-3 alternative would involve excavation of approximately 2,500 cubic yards (equivalent to approximately 110 truckloads) of material from the Settling Basin #2 Containment Cell. The volume and therefore the potential for short-term impacts are substantially less than the volume of soil that would be removed as part of the AOC-4 alternative. Measures that would be implemented as part of this alternative are not expected to engender significant adverse environmental impacts. It is anticipated that the AOC-3 alternative would take approximately two to four months to complete.

The AOC-4 excavation (approximately 39,000 cubic yards of soil) would require a high degree of care in order to protect members of the community and workers from inhalation of asbestos fibers and high pH material which may be encountered in the AOC area. While engineering controls such as excavating and stabilizing asbestos soils “in the wet,” transporting soil in covered roll-off containers or trucks, and shipment of partially wet soils to the off-Site disposal facility could be implemented, the community could still be affected by the excavation effort due to increased risk from additional traffic, potential failure of engineering controls to limit fugitive dust during excavation or to maintain the uninterrupted flow of the Neponset River while the culvert is being removed, and in particular, transport of approximately 3,000 truckloads of contaminated soil. Given that the river would be temporarily re-routed, and the culvert that currently contains approximately 400 feet of the Neponset River would be removed, the aquatic environment would be disturbed/impacted; however, the river bank and bottom would be re-established after removal of the AOC soils and the aluminum culvert. It is anticipated that AOC-4 would take approximately six to 12 months to complete and have potential significant short-term impacts on site workers and the surrounding community, because of the reactivity of high pH material at depth and the greater potential for airborne emissions due to excavation and transport of a larger volume of soil containing asbestos than other alternatives.

5.7.6 Implementability

Alternative AOC-1 involves only conducting Five-Year Reviews; therefore, the alternative would be easily implemented and additional actions or monitoring could be readily undertaken. Alternative AOC-2 would require the establishment and implementation of broader institutional controls than currently exist for the AOC (including establishing soil management standards for the area under the buildings adjacent to the covered areas). Long-term monitoring, quarterly inspections, and five-year reviews would be completed as part of AOC-2 to assess the integrity of the fence, soil- and asphalt-covered portions of the AOC, the culvert beneath the AOC, as well as making sure contaminated soils under the buildings are properly managed.

The proposed technologies for alternatives AOC-3 and AOC-4 are standard activities that are routinely implemented and proven reliable that could be effectively monitored during construction to assess compliance with RAOs. In the case of AOC-3, long-term monitoring, quarterly inspections, and five-year reviews would allow for on-going monitoring for compliance with RAOs. However, the magnitude of the AOC-4 alternative (e.g., excavation of approximately 39,000 cubic yards of contaminated soil, removal of 400-feet of aluminum culvert, diversion of the Neponset River, etc.) would pose challenges to completing this alternative in a timely manner (e.g., in a single construction season), and coordination of a construction effort of this magnitude is considerable. Establishing and enforcing institutional controls for alternatives AOC-3 and AOC-4 would be readily implementable.

Additional future actions, if necessary, could be readily undertaken following completion of the AOC-3 alternative. Following river and riverbank restoration and backfilling of the excavations under the AOC-4 alternative, subsequent additional deeper excavations, if necessary, would require substantial effort.

The personnel, materials, and availability of technologies that would be implemented as part of these alternatives are generally available for alternatives AOC-3 and AOC-4. However, the AOC-4 remedial alternative would require substantial coordination to provide adequately trained personnel and appropriate equipment and materials to implement this alternative.

The availability of off-Site treatment and/or disposal facilities in Massachusetts for asbestos-containing soils that would be excavated in the AOC-3 and AOC-4 alternatives is somewhat limited, particularly considering the volume of soils that would be excavated under the AOC-4 alternative. However, there are currently treatment/disposal facilities that can accept this volume of asbestos-containing soils in the greater New England area.

The establishment of institutional controls and continued access to the Site for the AOC-2, AOC-3, and AOC-4 alternatives require the cooperation of affected property owners and, possibly, enforcement by regulators.

Given the magnitude of AOC-4 (e.g., excavation of approximately 39,000 cubic yards of soil, removal of 400 feet of aluminum culvert, etc.) the administrative implications associated with implementing this alternative would be substantial. Implementation of AOC-4 would require extensive coordination with regulatory agencies to address impacts to the Neponset River and/or wetland areas of the Site, and access to affected properties. Cooperation with surrounding property owners and local health authorities would be necessary to protect members of the community from inhalation of asbestos fibers. In addition, ongoing traffic control would be necessary given the amount of construction-related traffic that would occur in and around the Site.

5.7.7 Cost

The costs for the AOC alternatives are summarized in Table 13C. Alternative AOC-1 only has the limited cost of conducting Five-Year Reviews.

Alternatives AOC-2 and AOC-3 have the same O&M and periodic costs. Alternative AOC-4 has lower O&M and periodic costs, since most waste will be removed (therefore less O&M) and the Neponset River culvert does not have to be maintained under alternative AOC-4. The primary differences in cost between the three alternatives can be attributed to differences in capital costs.

Alternative AOC-2 has lower capital costs than alternative AOC-3. The cost of alternative AOC-3 is higher than alternative AOC-2 because of the excavation and off-Site disposal of contaminated soils in the Settling Basin #2 containment cell.

The cost of AOC-4 is substantially higher than both AOC-2 and AOC-3 due to the larger volume of excavation and off-Site disposal effort and the day-lighting of the Neponset River associated with AOC-4. However, even if AOC-4 were implemented, institutional controls would be required to preclude potential exposure by future receptors to contaminated soils beneath the water table and under the buildings.

5.8 Individual Analysis of the SSW Alternatives

An individual analysis of SSW alternatives is presented in Table 14D.

5.9 Comparative Analysis of the SSW Alternatives

The table below presents a qualitative summary of the results of the comparative analysis of SSW alternatives. This comparative analysis is presented in greater detail in the following subsections; however, the reader is referred to this table for a “big picture” understanding of a comparison of the SSW alternatives.

Comparative Analysis Summary of SSW Alternatives								
		Threshold Criteria		Balancing Criteria				
Alternative Designation	Abbreviated Description of Remedial Alternative	Protection of Human Health & the Environment	Achieve ARARs	Long-Term Effective-ness	Reduction of Toxicity, Mobility, and Volume through Treatment	Short-Term Effective-ness	Implement-ability	Cost
SSW-1	No Action	**N**	**N**	**N**	**N**	**Y**	**Y**	**L**
SSW-2	Limited Action	**N**	**N**	**P**	**N**	**Y**	**N**	**L**
SSW-3	Excavate/Dredge Soil/Sediment From Lot 33-257, 33-360, and Former Mill Tailrace, Aqueous Cap on Lewis Pond Sediment	**N**	**N**	**P**	**P**	**Y**	**P**	**M**
SSW-4	Excavate/Dredge Soil/Sediment From Lot 33-257, 33-360, and Former Mill Tailrace, Engineered Cap on Lewis Pond Sediment	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**M**
SSW-5	Excavate/Dredge Soil/Sediment	**Y**	**Y**	**Y**	**P**	**Y**	**Y**	**H**

Notes:

1) For the Threshold Criteria, criterion must be met for an alternative to be potentially selected. For the Balancing Criteria, meeting any individual criterion is a factor to be considered.

2) "**Y**" Meets Criterion
"**P**" Partially Meets Criterion
"**N**" Does Not Meet Criterion
"**L**" Low Cost
"**M**" Medium Cost
"**H**" High Cost

5.9.1 Overall Protection of Human Health and the Environment

Alternative SSW-1 is not protective of human health, because no measures would be taken to prevent exposure to contaminated sediment or soil. .

Alternative SSW-2 would rely entirely upon institutional controls and fencing to preclude access to contaminated sediment and soil along Lewis Pond, the Neponset River, and the Mill Tailrace. Therefore, SSW-2 is assumed to offer less protection of human health than SSW-3, SSW-4, or SSW-5.

Alternatives SSW-3, SSW-4, and SSW-5 provide protection of human health by excavation/dredging of contaminated sediment and soil along the Neponset River and Mill Tailrace. Alternative SSW-3 would be less protective at Lewis Pond since it relies on only the existing pond to act as an aqueous cap to prevent exposure to contaminated sediments and the potential for exposure by trespassers would continue to exist. Alternative SSW-4 would be more protective, as long as the engineered cap can protect against exposure or migration of all contaminants about risk or regulatory levels present in the Lewis Pond sediments. Alternative SSW-5 is the most protective alternative since it will permanently remove all contaminated sediment above risk or regulatory levels within Lewis Pond.

5.9.2 Compliance with ARARs

Alternative SSW-1 will not achieve chemical-specific ARARS.

Alternative SSW-2 will not achieve chemical-specific ARARs, since it may not adequately address risks posed by asbestos contaminated soils and sediments. While it will meet location-specific ARARs, it may not meet action-specific ARARs pertaining to hazardous waste.

Alternative SSW-3 will meet chemical-, location-, and action-specific ARARs along the Mill Tailrace and Neponset River. However, the aqueous cap proposed for Lewis Pond will not meet chemical-, location-, or action-specific standards if hazardous waste is present in the Lewis Pond sediments. The aqueous cap may be insufficient to prevent asbestos from migrating either to shore or downstream of Lewis Pond, where it may pose a risk of exposure, or from causing a risk to trespassers.

Alternative SSW-4, also meets all chemical-, location-, and action-specific ARARs along the Mill Tailrace and Neponset River. The engineered, subaqueous cap proposed for Lewis Pond may meet chemical-, location- and action-specific standards if it can be constructed and maintained to prevent the migration of asbestos and hazardous waste from the capped area. During remedial design, additional testing will be conducted to determine if characteristic hazardous waste will remain in place. If so, the cover (or cap) over the remaining wastes will be designed to meet relevant and appropriate hazardous waste standards.

Alternative SSW-5 will meet all chemical-, location-, and action-specific ARARs since it will excavate/dredge all contaminated sediment/soil from the Mill Tailrace, Neponset River, and Lewis Pond.

5.9.3 Long-Term Effectiveness and Permanence

Alternative SSW-1 would provide no risk reduction from baseline conditions. Therefore, this alternative is neither effective, nor permanent.

Alternative SSW-2 relies wholly upon institutional controls, and installation and maintenance of fencing to provide protection of human health. However, institutional controls can be difficult to implement on residential properties; therefore, SSW-2 is considered less effective and permanent than SSW-3, SSW-4, or SSW-5.

In alternative SSW-3, the West Street Dam would be operated to maintain an aqueous cap over asbestos-impacted sediments in Lewis Pond; however, the long-term effectiveness of this alternative is dependent upon continued control of water levels by operation of the West Street Dam under an institutional control. Pre-design studies would be necessary to assess if these measures are adequate to prevent asbestos fibers from becoming airborne. Upgrades to the West Street Dam and excavation/dredging along the Neponset River and the Former Mill Tailrace could be completed within approximately three to four months. However, asbestos and potentially hazardous waste contaminated sediments would remain beneath the aqueous cap in Lewis Pond for greater than 100 years. An aqueous cap is insufficient to isolate and cap hazardous waste and therefore is not effective or permanent.

The SSW-3 and SSW-4 alternatives would address contaminated soil or sediment along the Neponset River and the Former Mill Tailrace by excavation/ dredging with off-Site disposal. Excavation and dredging are well-proven and highly reliable means of addressing soil/sediment contamination, particularly when combined with confirmatory soil/sediment sampling.

Alternative SSW-4 may be reliable with regard to addressing asbestos-impacted sediments in Lewis Pond, as an engineered concrete, subaqueous cap would be established to preclude access to these sediments. However, the subaqueous cap would also have to be designed, installed, and maintained to prevent the release of hazardous wastes potentially present in the sediment. The SSW-4 alternative could be completed within approximately two to four months. Institutional controls would be required to ensure that no interference with the cap is takes place over time. Nonetheless, contaminated sediment would remain beneath the subaqueous cap for greater than 100 years; therefore, long-term monitoring, institutional controls, quarterly inspections and five-year reviews would be required.

Alternative SSW-5 would afford the highest degree of long-term effectiveness and permanence, as soils and sediments with COC concentrations greater than PRGs would be addressed by excavation/dredging with off-Site disposal. Excavation and dredging are well-proven and highly reliable means of addressing soil/sediment contamination, particularly when combined with confirmatory soil/sediment sampling. It is anticipated SSW-5 could be completed in approximately two to four months.

5.9.4 Reduction of Toxicity, Mobility, and/or Volume Through Treatment

Alternatives SSW-1 and SSW-2 provide no reduction of toxicity, mobility, or volume through treatment as no active remedial measures to reduce the mass of sediment/soil contamination would be implemented.

Alternatives SSW-3, SSW-4, and SSW-5 would reduce the toxicity, mobility, and volume of contaminants on-Site through stabilization of contaminated soil/sediment before it is disposed of off-Site. The amount of soil/sediment stabilized varies between the alternative depending on the quantity of soil/sediment to be excavated and the requirements of the off-site disposal facility. Alternatives SSW-3 and SSW-4 would involve the stabilization of approximately 850 cubic yards of contaminated soil/sediment. Alternative SSW-5 would involve the stabilization of approximately 4,450 cubic yards of contaminated soil/sediment. The degree to which alternatives SSW-3, SSW-4, and SSW-5 would satisfy the statutory preference for treatment would depend upon the quantity of contaminated soil stabilized on site prior to off-site disposal.

5.9.5 Short-Term Effectiveness

The implementation of alternatives SSW-1 and SSW-2 are not anticipated to pose additional risks or impacts to the community or environment beyond those posed by current conditions. Risks to workers performing fence installation and repair, long-term monitoring, quarterly inspections, and 5-year reviews as part of alternative SSW-2 can be controlled and mitigated with proper health and safety measures.

The SSW-3, SSW-4, and SSW-5 alternatives would involve excavation/dredging and various construction activities (SSW-5 to a greater degree than SSW-3 or SSW-4). These activities may potentially generate fugitive dust containing asbestos fibers. In order to protect workers and members of the community, these emissions would be controlled by engineering controls such as wetting. In addition, transporting soil/sediment in covered roll-off containers or trucks, and shipment of partially wet soil/sediment to the off-Site disposal facility could also be implemented. Risks to workers performing activities associated with SSW-3, SSW-4, or SSW-5 can be controlled and mitigated with proper health and safety measures.

Short-term environmental impacts from SSW-3 would likely be less than from SSW-4 or SSW-5 since it will only maintain the current inundated status of Lewis Pond. All three alternatives involve destruction/disturbance of approximately 1,200 square feet of wetlands in the Former Mill Tailrace and along the Neponset River due to excavation/dredging of soil/sediment; however, the disturbed or destroyed wetlands would be mitigated/restored as part of this alternative. Since the water level that would be maintained in Lewis Pond as part of the SSW-3 alternative is generally consistent with typical water levels historically observed in Lewis Pond, no significant environmental impacts to wetland or aquatic resources in and around Lewis Pond would be likely.

SSW-4 and SSW-5 involve destruction/disturbance of approximately 47,600 square feet of wetland and aquatic resources in the Former Mill Tailrace, Neponset River, and Lewis Pond; however, the disturbed or destroyed wetlands would be mitigated/restored as part of these alternatives.

5.9.6 Implementability

Alternative SSW-1 involves no remedial action, other than conducting Five-Year Reviews and therefore is readily implementable.

Alternative SSW-2 involves limited remedial actions (long-term monitoring and the establishment and enforcement of institutional controls); therefore, the alternative can be easily implemented and additional actions or monitoring could be readily undertaken. However, the feasibility of maintaining and enforcing institutional controls on residential properties, as is proposed for alternative SSW-2, may be difficult.

The proposed dredging/excavation technologies for the Mill Tailrace and Neponset River under alternatives SSW-3, SSW-4, and SSW-5 are generally easily implemented and are proven reliable. Confirmatory soil/sediment sampling, quarterly inspections, and five-year reviews would allow for appropriate monitoring of the success of these remedial alternatives in achieving RAOs. However, the reliability of maintenance of the Lewis Pond water level under SSW-3 at precluding air-borne transport and potential inhalation of asbestos fibers and the release of hazardous waste from Lewis Pond sediment would require further evaluation as a pre-design measure. The personnel, materials, and availability of technologies that would be implemented as part of these alternatives are generally available.

Additional actions could be readily undertaken for alternatives SSW-3 and SSW-5; however, additional action, if necessary, for the SSW-4 alterative to address asbestos-impacted sediment in Lewis Pond could be difficult due to the presence of the engineered isolation cap constructed over these sediments as part of this alternative.

The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/ disposal facilities that can accept this volume of asbestos-containing soil/sediment in the greater New England.

The establishment of institutional controls and continued access to the Site for the SSW-2, SSW-3, and SSW-4 alternatives require the cooperation of affected property owners, in the case of deed restrictions, and some types of institutional controls, such as local ordinances, may require regulatory enforcement. However, as described above, the feasibility of maintaining and enforcing institutional controls on residential properties, as is proposed for alternative SSW-2, is questionable. Alternatives SSW-3, SSW-4, and SSW-5 would require coordination with regulatory agencies to address potential impacts to wetland or aquatic resources. In particular, alternatives SSW-4 and SSW-5 would require disturbance or

destruction of approximately 47,600 square feet of wetland within Lewis Pond, which would be re-established.

Alternatives SSW-4 and SSW-5 would require access to and cooperation with the owner of the West Street Dam during construction and dredging/excavation activities, and potentially during inspections/maintenance activities associated with the engineered isolation cap installed as part of SSW-4. SSW-3 would require long-term access to and cooperation with the owner of the West Street Dam to control surface water elevations essentially indefinitely.

5.9.7 Cost

The costs for the SSW alternatives are summarized in Table 13D.

Alternative SSW-1 only has the limited cost of conducting Five-Year Reviews. Alternative SSW-2 additionally has O&M costs associated with fence maintenance.

Costs for alternatives SSW-3 and SSW-4 are higher than SSW-2 due to the excavation of soil and sediment from the Former Mill Tailrace and Neponset River Lots 33-257 and 33-360, as well as establishment of aqueous and subaqueous caps in Lewis Pond. Both alternatives (SSW-3 and SSW-4) are similar in cost, with SSW-4 having a higher capital cost due to the subaqueous cap, but SSW-3 having higher O&M costs for maintenance of the dam.

Alternative SSW-5 has the highest cost due to excavation of the largest volume of soil and sediment.

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TABLE 1
Actionable Human Health Risks and Associated Remedial Action Objectives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Location	Receptor	Medium	COC contributing an ILCR >1E-06 to a cumulative ILCR >1E-04, contributing an HQ >1 to a target organ-specific HI>1, PBL >5%, or elevated pH	Exposure Route	RME ILCR	Max RME Target Organ-Specific HI	PBL	Elevated pH	COC (ILCR <1E-06, HI <1, PBL <5%, but EPC > MCL) (1)	Remedial Action Objectives / Rationale for Exclusion from Further Consideration
Residential Scenarios										
Lot 33-257	Current Resident	Soil	lead	ingestion	<1E-04	<1	13.40%	No	NA	Prevent ingestion by a future resident of soil with lead concentrations resulting in PBL > 5% and meet ARARs
East of South Street On-Facility[6]	Future Resident (see note 2)	Soil	trichloroethene; benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; arsenic	ingestion and dermal contact	1.E-03	<1	<5%	No	NA	Prevent ingestion/dermal contact by a future resident with soil having COC concentrations which result in cumulative ILCR > 1E-04 and meet ARARs
		Indoor air from soil vapor (SB-09 area)	trichloroethene	inhalation	6E-04	<1	- (3)	- (4)	NA	Prevent inhalation of indoor air by a future resident from soil vapor having COPC concentrations which result in a cumulative ILCR > 1E-04 and meet ARARs
Old Railroad and Former Lower Mill Pond Area[6]	Future Resident (see note 2)	Soil	benz(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; arsenic	ingestion and dermal contact	5.E-04	2	<5%	No	NA	Prevent ingestion/dermal contact by a future resident with soil having COC concentrations which result in cumulative ILCR > 1E-04 or non-carcinogenic HI > 1 and meet ARARs
Off-Facility groundwater	Future Resident (see note 2)	Tap water from groundwater	benzene; benzo(a)pyrene; dibenz(ah)anthracene; arsenic; manganese; vanadium; lead; pH	ingestion and dermal contact	2.E-03	20	8.08%	Yes	no COCs for which this is true	Prevent ingestion/dermal contact/inhalation by a future resident with groundwater used as a domestic water supply having COC concentrations that exceed MCLs or result in cumulative ILCR > 1E-04, non-carcinogenic HI > 1, or PBL > 5%, or where pH conditions are elevated
On-Site Groundwater	Future Resident (see note 2)	Tap water from groundwater	methylene chloride; trichloroethene; benz(a)anthracene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; bis(2-ethylhexyl)phthalate; carbazole; benzene; 2-methylnaphthalene; naphthalene; benzo(a)pyrene; 4-methylphenol; antimony; arsenic; chromium; manganese; nickel; vanadium; zinc; pH	ingestion and dermal contact	2.E-02	200	<5%	Yes	lead, styrene	Prevent ingestion/dermal contact/inhalation by a future resident with groundwater used as a domestic water supply having COC concentrations that exceed MCLs or result in cumulative ILCR > 1E-04, non-carcinogenic HI > 1, or where pH conditions are elevated
		Vapor from use of groundwater as tap water	ethylbenzene; trichloroethene; benzene; 2-methylnaphthalene; naphthalene	inhalation	3.E-04	200	- (3)	- (4)		Prevent inhalation of vapor by a future resident from groundwater used as tap water having COC concentrations that exceed MCLs or result in cumulative ILCR > 1E-04 or non-carcinogenic HI >1
Construction Worker Scenarios										
Lot 33-257	Future Construction Worker	Soil	lead	ingestion	<1E-04	<1	6.50%	No	NA	Prevent ingestion by a future construction worker of soil having lead concentrations resulting in PBL > 5% and meet ARARs
West of South Street On-Facility[6]	Future Construction Worker	Dermal contact with groundwater	pH	dermal contact	<1E-04	<1	<5%	Yes	NA	Prevent dermal contact by a future construction worker with groundwater having elevated pH conditions and meet ARARs
Off-facility groundwater	Future Construction Worker	Dermal contact with groundwater	pH	dermal contact	<1E-04	<1	<5%	Yes	NA	
Wader Scenarios										
Former Mill Tailrace	Current/Future Wader	Surface water	pH	dermal contact	<1E-04	<1	<5%	Yes	NA	Prevent dermal contact by a current/future wader with surface water having elevated pH conditions and meet ARARs
Site Worker Scenarios										
East of South Street on-Facility[6]	Future Site Worker	Indoor air from soil vapor (SB-09 area)	trichloroethene	inhalation	2E-04	<1	- (3)	- (4)	NA	Prevent inhalation of indoor air by a future site worker from soil vapor having COC concentrations which result in a cumulative ILCR > 1E-04 and meet ARARs
Asbestos Scenarios										
Soil	All	Inhalation of asbestos fibers from soil	asbestos	inhalation	<1E-04	-	-	-	NA	Prevent exposure to asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; and meet ARARs.
Sediment	All	Inhalation of asbestos fibers from sediment	asbestos	inhalation	<1E-04	-	-	-	NA	Prevent exposure to asbestos fibers from sediment having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from sediment which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; and meet ARARs.

TABLE 1
Actionable Human Health Risks and Associated Remedial Action Objectives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Location	Receptor	Medium	COC contributing an ILCR >1E-06 to a cumulative ILCR >1E-04, contributing an HQ >1 to a target organ-specific HI>1, PBL >5%, or elevated pH	Exposure Route	RME ILCR	Max RME Target Organ-Specific HI	PBL	Elevated pH	COC (ILCR <1E-06, HI <1, PBL <5%, but EPC > MCL) (1)	Remedial Action Objectives / Rationale for Exclusion from Further Consideration
Scenarios That Will Not Be Considered Further in the Feasiblity Study										
West of South Street On-Facility[6]	Future Resident (see note 2)	Soil	arsenic & PAHs	ingestion and dermal contact	2E-04	<1	<5%	No	NA	Soil risk for the future resident at West of South Street On-Facility area exceeds 1E-04 when the risk associated with asbestos in soil is considered (BHHRA Addendum, 2008). However, residential use of this area is not considered a reasonably anticipated future use and will be prevented through the use of insitutional controls. Therefore, standard PRGs were not developed for this area. See Appendix B-3 for further discussion.
		Plant tissue from Soil	none	ingestion of plant tissue	<1E-04	<1	- (3)	- (4)	NA	As a result of the uncertainty in the home garden pathway and the likelihood that this pathway will be incomplete, risk associated with the home garden pathway was not included in determining actionable human health risk for the West of South Street On-Facility area. Uncertainty in the home garden pathway is due to the use of screening-level bioconcentration factors (BCFs), with unknown relevance to Site conditions, to predict COC concentrations in plant tissue. BCFs were selected from USEPA's Soil Screening Guidance (USEPA, 1996), and for COCs without a USEPA BCF, from MassDEP's (2001) document in support of Proposed MCP Numerical Standards.
Old Railroad and Former Lower Mill Pond Area[6]	Future Resident (see note 2)	Plant tissue from Soil	arsenic	ingestion of plant tissue	3.E-04	2	- (3)	- (4)	NA	As discussed in the note above for the West of South Street On-Facility area, risks and hazards for the home garden pathway are uncertain because they are based on a non-site-specific BCF from USEPA's soil screening guidance. Therefore, preliminary remediation goals (PRGs) for soil will not incorporate the garden exposure pathway given the uncertainty associated with doing so and the likelihood that this pathway will be incomplete.
Off-site groundwater east of Neponset River (SH-27)	Future Resident (see note 2)	Tap Water from Groundwater	trichloroethene; manganese	ingestion	<1E-04	2	<5%	No	no COCs for which this is true	While the concentrations of TCE and manganese in groundwater from the 2003 sampling round suggest potentially actionable risk in this exposure area, these potential risks will not be further evaluated in the FS for the following reasons: 1. This potential risk is based on only one sampling round (e.g., the 2003 sampling round). If data from the more recent 2006 sampling round were used to calculate potentially actionable risk, TCE and manganese would not present actionable risk as defined in this table. 2. TCE was detected in only one groundwater sample (concentration of 5.1 ug/L) in one of the wells (SH-27R during the 2003 sampling round) at a concentration slightly above the MCL for TCE of 5 ug/L. Concentrations of TCE were below the MCL in groundwater samples collected from wells SH-27S, SH-27D, and SH-27R in the 2006 sampling round. 3. Manganese was detected in two groundwater samples from this area during the 2003 sampling round at concentrations above the federal lifetime health advisory level of 300 ug/L (420 ug/L in well SH-27R, and 320 ug/L in well SH-27S). Concentrations of manganese were below the federal lifetime health advisory level in the groundwater samples collected from wells SH-27S, SH-27D, and SH-27R in the 2006 sampling round.
Off-site groundwater east of Neponset River (SH-28)	Future Resident (see note 2)	Tap water from groundwater	manganese	ingestion	<1E-04	3	<5%	No	no COCs for which this is true	While the concentrations of manganese in groundwater from the 2003 sampling round suggest potentially actionable risk in this exposure area, this potential risk will not be further evaluated in the FS for the following reasons. 1. This potential risk is based on only one sampling round (e.g., the 2003 sampling round). If data from the more recent 2006 sampling round were used to calculate potentially actionable risk, manganese would not present actionable risk as defined in this table. 2. Manganese was detected in only one groundwater sample (760 ug/L) in one of the wells (SH-28S during the 2003 sampling round) at a concentration above the federal lifetime health advisory level of 300 ug/L. Concentrations of manganese were below the federal lifetime health advisory level in the groundwater samples collected from wells SH-28S, SH-28D, and SH-28R in the 2006 sampling round.

Notes:
1. Contaminants of Concern (COCs) in this column are not associated with the levels of risk defined in column 4, but have Exposure Point Concentrations (EPCs) that are greater than Maximum Contaminant Levels (MCLs). "NA" means that a comparison to MCLs is not relevant for the receptor/medium combination. "No COCs for which this is true" means that the receptor/medium meets the first three criteria in the column header (i.e. ILCR < 1E-6, HI < 1, and PBL < 5%) and does not have any COCs with EPCs that are greater than MCLs.
2. Unrestricted future residential use is not considered a reasonably anticipated future use in these areas of the Site due to the current zoning by-laws. Under current zoning, the most sensitive possible future Site receptor for "direct contact with soil" exposure pathways is a child at a daycare facility. A future daycare facility was not considered as part of the Baseline Human Health Risk Assessment (BHHRA), and the potential risks associated with future residential use are likely higher than those associated with a daycare facility. Therefore, the development of human health risk based PRGs for use in the evaluation of remedial alternatives for the Feasibility Study (FS) are based on a daycare facility scenario, and not unrestricted residential use.
3. Exposures to lead for this receptor/medium combination were not quantified in the BHHRA.
4. pH is not a COC for the inhalation pathway or garden pathway.
5. ILCR - Incremental Lifetime Cancer Risk
6. East of South Street and Old Railroad and Former Lower Mill Pond Areas are the basis for the "SO" alternatives defined later in this document; West of South Street area is the basis for the "AOC" alternatives.

TABLE 2
Perspective on Actionable Ecological Risks
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Location	Receptor	Medium	Chronic Exposure HQ				Acute			Perspective	Actionable Risk Summary
			COCs	Exposure Route	CTE HQ	RME HQ	COC	Exposure Route	Acute HQ		
Aquatic Invertebrates and Fish											
Lewis Pond	Invertebrates	Sediment	Nickel	Ingestion, direct contact	N (20), L(2)	N (30), L(3)	-	-	-	The effect level for this evaluation is based on an effect on growth; however, direct toxicity testing of Lewis Pond sediments at one location indicates no measurable impact on growth of benthic invertebrates (i.e., the sediments are not toxic). In addition, AVS/SEM data indicate that all the Lewis Pond sediment samples are in the "unlikely to be toxic" category (USEPA, 1999).	No Actionable Risk: Sediment not toxic.
Aquatic Wildlife											
Neponset River	Muskrat	Sediment (from sediment and invertebrate ingestion)	Aluminum	Ingestion	N (20), L(2)	N (20), L(2)	-	-	-	Available information does not indicate the Site is a significant source of anthropogenic aluminum. Aluminum risks are likely overestimated (USEPA, 2003): · Aluminum is most abundant metallic element in earth's crust, and occurs naturally in soils/sediments at concentrations generally orders of magnitude higher than anthropogenic inputs; · Soluble forms of aluminum, which are typically used in laboratory toxicity testing to develop soil screening values and may be toxic, are poorly understood and difficult to measure in soils/sediments; · Total aluminum in soil (as typically measured, including at the Site) is not correlated with toxicity; · Hence, comparison of total aluminum concentrations in soil to soluble aluminum-based screening values is deemed inappropriate by USEPA, and will tend to overestimate ecological impacts; · Aluminum toxicity only appears to be a potential problem for soils with pH < 5.5, as soluble and toxic forms of aluminum are only present at these pHs. pH (5.4 - 7.8; ave. - 6.4) of Site sediment is similar to reference area (SedRN, SedRNwd samples) sediment pH (5.4 - 7.0; ave - 6.4). Tailrace sediments (considered separately) have higher pH (7.0 - 10.3; ave. - 8.9). Hence, Site-related aluminum toxicity is not indicated (assuming conclusions from USEPA, 2003 on aluminum toxicity are generally applicable to sediment as well as soil).	No Actionable Risk: Aluminum is background, and its risks are overestimated.
	Raccoon	Sediment (from sediment and invertebrate ingestion)	Aluminum	Ingestion	N (100), L(10)	N (100), L(10)	-	-	-		
Lewis Pond	Muskrat	Sediment (from sediment, invertebrate, and plant ingestions)	Aluminum	Ingestion	N (20), L(2)	N (20), L(2)				The risks for aluminum at the reference area (Muskrat HQ: CTE - N [30], L [3]; RME- N [30], L [3] // Raccoon HQ: CTE - N [200], L [20]; RME - N [200], L [20]) are greater than at the Site. In addition, risks for aluminum are likely overestimated for the same reasons mentioned above for the Neponset River.	No Actionable Risk: Reference area aluminum risks are greater than at Site.
	Raccoon	Sediment (from sediment, invertebrate, plant, and fish ingestion)	Aluminum	Ingestion	N (100), L(10)	N (100), L(10)					
Upper Former Mill Tailrace	Muskrat	Sediment and surface water (from sediment, surface water, invertebrate, and plant ingestion)	Aluminum	Ingestion	N (40), L(4)	N (40), L(4)	-	-	-	Risks for aluminum are likely overestimated for the same reasons mentioned above for the Neponset River.	No Actionable Risk: Aluminum is background, and its risks are overestimated.
Terrestrial Birds and Small Mammals											
East of South Street	Robin	Earthworm and Soil	Lead	Ingestion	N (20), L(2)	N (40), L(4)	-	-	-	The risks for lead at the reference area (CTE HQ - N [30], L [3]; RME HQ - N [50], L [5]) are greater than at the Site.	No Actionable Risk: Reference area lead risks are greater than at Site.
		Earthworm	Selenium	Ingestion	N (3), L(1)	N (6), L(3)	-	-	-	The risks for selenium at the reference area (CTE HQ - N [2], L [1]; RME HQ - N [4], L [2]) are equal to or slightly less than at the Site. Although reference area earthworm selenium concentrations (ave. 0.97 mg/kg) are slightly less than at the Site (ave. 1.3 mg/kg), reference area soil selenium concentrations (ave. 1.0 mg/kg) are greater than at the Site (ave. 0.44 mg/kg).	No Actionable Risk: Reference area selenium risks are similar to Site. Reference area soil selenium concentrations are greater than at Site.
	Shrew	Earthworm and Soil	Aluminum	Ingestion	N (200), L(20)	N (200), L(20)	-	-	-	Available information does not indicate the Site is a significant source of anthropogenic aluminum. The risks for aluminum at the reference area are equal to those at the Site. In addition, risks for aluminum are likely overestimated for the following reasons (USEPA, 2003): · Aluminum is most abundant metallic element in earth's crust, and occurs naturally in soils/sediments at concentrations generally orders of magnitude higher than anthropogenic inputs; · Soluble forms of aluminum, which are typically used in laboratory toxicity testing to develop soil screening values and may be toxic, are poorly understood and difficult to measure in soils/sediments; · Total aluminum in soil (as typically measured, including at the Site) is not correlated with toxicity; · Hence, comparison of total aluminum concentrations in soil to soluble aluminum-based screening values is deemed inappropriate by USEPA, and will tend to overestimate ecological impacts; · Aluminum toxicity only appears to be a potential problem for soils with pH < 5.5, as soluble and toxic forms of aluminum are only present at these pHs. pH (4.1 - 7.5; ave. - 5.7) of Site upper (0-1') soil is similar to or greater than reference area (OSR, FPR samples) soil pH (3.9 - 5.9; ave. - 5.0). Hence, Site-related aluminum toxicity is not indicated.	No Actionable Risk: Reference area aluminum risks are equal to Site.
		Earthworm	Selenium	Ingestion	N (2), L(1)	N (3), L(2)	-	-	-	The risks for selenium at the reference area (CTE HQ - N [1], L [0.9]; RME HQ - N [2], L [2]) are equal to or slightly less than at the Site. Although reference area earthworm selenium concentrations (ave. 0.97 mg/kg) are slightly less than at the Site (ave. 1.3 mg/kg), reference area soil selenium concentrations (ave. 1.0 mg/kg) are greater than at the Site (ave. 0.44 mg/kg).	No Actionable Risk: Reference area selenium risks are similar to Site. Reference area soil selenium concentrations are greater than at Site.

TABLE 2
Perspective on Actionable Ecological Risks
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Location	Receptor	Medium	Chronic Exposure HQ				Acute			Perspective	Actionable Risk Summary
			COCs	Exposure Route	CTE HQ	RME HQ	COC	Exposure Route	Acute HQ		
West of South Street	Robin	Earthworm	Selenium	Ingestion	N (3), L(1)	N (4), L(2)	-	-	-	The risks for selenium at the reference area (CTE HQ - N [2], L [1]; RME HQ - N [4], L [2]) are equal to or only slightly less than at the Site. Although reference area earthworm selenium concentrations (ave. 0.97 mg/kg) are slightly less than at the Site (ave. 1.2 mg/kg), reference area soil selenium concentrations (ave. 1.0 mg/kg) are greater than at the Site (ave. 0.31 mg/kg).	No Actionable Risk: Reference area selenium risks are similar to Site. Reference area soil selenium concentrations are greater than at Site.
	Shrew	Earthworm and Soil	Aluminum	Ingestion	N (200), L(20)	N (300), L(30)	Aluminum	Ingestion	N (20), L(2)	The chronic risks for aluminum at the reference area (CTE HQ - N [200], L [20]; RME HQ - N [200], L [20]) are equal to or only slightly less than at the Site. The acute risks for aluminum at the reference area (N [10], L [1]) are slightly less than at the Site. In addition, risks for aluminum are likely overestimated for the same reasons mentioned above for East of South Street.	No Actionable Risk: Reference area aluminum chronic risks are similar to Site. Aluminum is background, and its risks are overestimated.
Orlando Property	Robin	Earthworm	Lead	Ingestion	N (30), L(3)	N (60), L(6)	-	-	-	The risks for lead at the reference area (CTE HQ - N [30], L [3]; RME HQ - N [50], L [5]) are equal to or only slightly less than at the Site. In addition, reference area soil lead concentrations (ave. 64 mg/kg) are greater than at Site (ave. 43 mg/kg).	No Actionable Risk: Reference area lead risks are similar to Site. Reference area soil lead concentrations are greater than at Site.
		Earthworm	Selenium	Ingestion	N (10), L(5)	N (20), L(8)	-	-	-	Although reference area earthworm selenium concentrations (ave. 0.97 mg/kg) are less than at the Site (ave. 4.5 mg/kg), reference area soil selenium concentrations (ave. 1.0 mg/kg) are greater than at the Site (ave. 0.30 mg/kg).	No Actionable Risk: Reference area soil selenium concentrations are greater than at Site.
	Shrew	Earthworm	Aluminum	Ingestion	N (100), L(10)	N (100), L(10)	-	-	-	The risks for aluminum at the reference area (CTE HQ - N [200], L [20]; RME HQ - N [200], L [20]) are greater than at the Site. In addition, risks for aluminum are likely overestimated for the same reasons mentioned above for East of South Street.	No Actionable Risk: Reference area aluminum risks are greater than at Site.
		Earthworm	Selenium	Ingestion	N (6), L(4)	N (10), L(6)	-	-	-	Although reference area earthworm selenium concentrations (ave. 0.97 mg/kg) are less than at the Site (ave. 4.5 mg/kg), reference area soil selenium concentrations (ave. 1.0 mg/kg) are greater than at the Site (ave. 0.30 mg/kg).	No Actionable Risk: Reference area soil selenium concentrations are greater than at Site.
Floodplain	Robin	Earthworm and Soil	Lead	Ingestion	N (40), L(4)	N (50), L(5)	-	-	-	The risks for lead at the reference area (CTE HQ - N [30], L [3]; RME HQ - N [50], L [5]) are equal to or only slightly less than at the Site.	No Actionable Risk: Reference area lead risks are similar to Site.
		Earthworm	Selenium	Ingestion	N (2), L(1)	N (3), L(2)	-	-	-	The risks for selenium at the reference area (CTE HQ - N [2], L [1]; RME HQ - N [4], L [2]) are equal to or greater than at the Site.	No Actionable Risk: Reference area selenium risks are greater than or equal to Site.
	Shrew	Earthworm and Soil	Aluminum	Ingestion	N (100), L(10)	N (200), L(20)	Aluminum	Ingestion	N (10), L(2)	The chronic risks for aluminum at the reference area (CTE HQ - N [200], L [20]; RME HQ - N [200], L [20]) are greater than or equal to at the Site. The acute risks for aluminum at the reference area (N [10], L [1]) are equal to or slightly less than at the Site. In addition, risks for aluminum are likely overestimated for the same reasons mentioned above for East of South Street.	No Actionable Risk: Reference area aluminum chronic risks are greater than or equal to Site. Aluminum is background, and its risks are overestimated.

Notes:

1. Exceedances of NRWQCs and Class B Massachusetts water quality criteria in surface water (including those for pH) are addressed in the Feasibility Study.

2. Refer to the Baseline Ecological Risk Assessment (BERA), the Addendum to the Remedial Investigation (RI) Report, and the text of this Report for further exploration of potential ecological risks.

3. Following standard approaches used for ecological risk assessments completed under the Comprehensive Environmental Response and Liability Act (CERCLA), the BERA evaluated baseline potential ecological risk only. The BERA did not draw conclusions about whether Chemicals of Concern (COCs) are present in the environment because of Site-related activities, or whether they represent a background condition unrelated to the Site. Additionally, the BERA did not draw conclusions about whether chemicals are elevated in the environment over concentrations that may be expected to be naturally occurring, or whether a potential adverse effect is of sufficient magnitude to warrant remedial action. These matters of perspective are further discussed in the "Perspective" and "Actionable Risk Summary" columns of this table.

4. The BERA describes potential ecological risks at the site and ranks these risks in terms of confidence levels associated with this assessment of potential risk. The BERA describes low, moderate, and high confidence levels associated with potential risks at the site. Potential risks with low levels of confidence (e.g., those potential risks that had hazard quotients for the CTE and RME cases above one based on comparison to the NOAEL or NOED, but less than or equal to one based on comparison to the LOAEL or LOED) were determined not to be of great enough confidence or sufficient magnitude to warrant remedial action at the Site. Potential risks with moderate and high levels of confidence are presented on this table.

N ( ), L ( ) = NOAEL- or NOED-based value, LOAEL- or LOED-based value

TABLE 3A
Contaminants of Concern for Soils
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Contaminants of Concern (COCs)	Human Health Risk			ARAR
	Daycare Child Scenario (ESS/ORR)	Site Worker Scenario (ESS)	Residential Lot Scenario	
Inorganics/Metals				
Arsenic	X			
Lead			X (Lot 33-257 only)	
Asbestos				X
VOCs				
Trichloroethene (TCE)	X (Vapor)	X (Vapor)		
SVOCs				
Benzo(a)anthracene	X			
Benzo(a)pyrene	X			
Benzo(b)fluoranthene	X			
Dibenz(a,h)anthracene	X			
Indeno(1,2,3-cd)pyrene	X			

Notes:

1. The East of South Street Area (ESS) and Old Railroad and Former Lower Mill Pond Area (ORR) Daycare Child Scenario assumes children are present on the Site, and their potential exposure to COCs drives Site clean up. The ESS Site Worker Scenario assumes that adults are the primary exposed population, and their potential exposure to COCs drives Site clean up. The Residential Lot Scenario assumes a residential scenario for Lot 33-257, including potential future construction worker exposure. Refer to text and Appendix B-3 for further discussion regarding these scenarios. Note that the ESS/ORR areas are the basis for the "SO" alternatives defined later in this document.

2. "X" indicates selection as COC.

3. Human health risk-based COCs selected as presented in Table B-3.2 Summary of Potentially Actionable Human Health Risks - BHHRA and BHHRA Addendum, included in Appendix B-3.

4. “(Vapor)” indicates selection as COC is based on potential risk due to inhalation of indoor air impacted by vapor intrusion from contaminated soil/soil vapor.

5. No actionable ecological risks were identified based on the Baseline Ecological Risk Assessment (BERA). Refer to Table 2, Perspective on Actionable Ecological Risks.

TABLE 3B
Recommended Soil Preliminary Remediation Goals
Feasibility Study
Blackburn Union Privileges Superfund Site
Walpole, Massachusetts

Contaminant of Concern (COC)	Concentrations in mg/kg (unless otherwise noted)					
	Recommended Soil PRG			Basis for Recommended PRG		
	Daycare Child Scenario (ESS/ORR)	Site Worker Scenario (ESS)	Residential Lot Scenario	Daycare Child Scenario (ESS/ORR)	Site Worker Scenario (ESS)	Residential Lot Scenario
Inorganics/Metals						
Arsenic	20			MassDEP Background		
Lead			400 (Lot 33-257 only)			HH (IEUBK)
Asbestos	Less than 1%; would not contribute to a cumulative ILCR > 1E-04 through inhalation pathway			ARAR and HH		
VOCs						
Trichloroethene (TCE)	0.065	0.065		HH (c) – Vapor	HH (c) – Vapor	
SVOCs						
Benzo(a)anthracene	5.1			HH (c)		
Benzo(a)pyrene	2			MassDEP Background		
Benzo(b)fluoranthene	5.1			HH (c)		
Dibenz(a,h)anthracene	0.51			HH (c)		
Indeno(1,2,3-cd)pyrene	5.1			HH (c)		

Notes:

1. Recommended Soil Preliminary Remediation Goals (PRGs) are given in milligrams per kilogram (mg/kg) which are equivalent to parts per million (ppm), unless otherwise noted.

2. The East of South Street Area (ESS) and Old Railroad and Former Lower Mill Pond Area (ORR) Daycare Child Scenario assumes children are present on the Site, and their potential exposure to COCs drives Site clean up. The ESS Site Worker Scenario assumes that adults are the primary exposed population, and their potential exposure to COCs drives Site clean up. The Residential Lot Scenario assumes a residential scenario for Lot 33-257, including potential future construction worker exposure. Refer to text for further discussion regarding these scenarios. Note that the ESS/ORR areas are the basis for the "SO" alternatives defined later in this document.

3. “HH (c)” indicates the PRG is based on potential carcinogenic human health-based risk (risk level of 1E-05 or less).

4. "HH (IEUBK)" indicates the PRG is based on potential human health-based risk as indicated by the USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) model and USEPA 2003 "Superfund Lead-Contaminated Residential Sites Handbook" (OSWER 9285.7-50) which states the "IEUBK model should be used to assess risks posed by contaminated soils and to determine PRGs for soils at residential sites".

5. “Vapor” indicates PRG is based on potential risk due to inhalation of indoor air impacted by vapor intrusion from contaminated soil/soil vapor.

6. “MassDEP Background” indicates that a compound-specific background value developed by the Massachusetts Department of Environmental Protection (May 2002) for native soil has been selected as the PRG.

7. Further discussion on the basis/development of soil PRGs is provided in Appendix B-3.

TABLE 4A
Contaminants of Concern for Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Contaminant of Concern (COC)	Human Health Risk (Tap Water)	Exceeds SDWA MCL
Inorganics/Metals		
Antimony	X	X
Arsenic	X	X
Chromium *	X	X
Lead	X	X
Manganese	X	NA
Nickel	X	NA
Vanadium	X	NA
Zinc	X	NA
pH (elevated)**	X	NA
VOCs		
Benzene	X	X
Ethylbenzene	X	
Methylene Chloride (Dichloromethane)	X	X
Toluene		X
Trichloroethene (TCE)	X	X
Styrene		X
SVOCs		
Benzo(a)anthracene	X	NA
Benzo(a)pyrene	X	X
Benzo(b)fluoranthene	X	NA
Bis(2-ethylhexyl)phthalate	X	X
Carbazole	X	NA
Dibenz(a,h)anthracene	X	NA
Indeno(1,2,3-cd)pyrene	X	NA
Methylnaphthalene (2-)	X	NA
Methylphenol (4-)	X	NA
Naphthalene	X	NA

Notes:

1. "X" indicates selection as COC.

2. "NA" indicates a USEPA Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) is not currently established for the COC.

3. Human health risk-based COCs selected as presented in Table B-3.2 Summary of Potentially Actionable Human Health Risks - BHHRA and BHHRA Addendum, included in Appendix B-3.

4. No groundwater contaminants were identified as potentially impacting indoor air (i.e., by vapor intrusion) at levels exceeding the CERCLA Risk Range.

5. Potential impact of groundwater on surface water will be evaluated directly by the analysis of surface water samples. Refer to surface water COC Table 6A.

6. "*" indicates selection of chromium as a risk-based COC is based on the assumption it is present largely in the hexavalent (Cr^{+6}) state. In reality, chromium is likely largely in the less toxic trivalent (Cr^{+3}) state.

7. "**" indicates that pH was selected as a groundwater COC based on exceedances of screening criteria. No hazard calculation could be performed for pH due to a lack of toxicity values.

TABLE 4B
Recommended Groundwater Preliminary Remediation Goals
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Contaminant of Concern (COC)	Recommended Groundwater PRG (µg/l unless otherwise noted)	Basis for Recommended PRG
Inorganics/Metals		
Antimony	6	MCL
Arsenic	10	MCL
Chromium	100	MCL
Lead	15	MCL/HH (IEUBK)
Manganese	300	Lifetime Health Advisory
Nickel	210	HH (nc)
Vanadium	45	HH (nc)
Zinc	3,100	HH (nc)
pH	< 8.5 s.u.	SMCL
VOCs		
Benzene	5	MCL
Ethylbenzene	700	MCL
Methylene Chloride (Dichloromethane)	5	MCL
Toluene	1000	MCL
Trichloroethene (TCE)	5	MCL
Styrene	100	MCL
SVOCs		
Benzo(a)anthracene	0.1†	PQL
Benzo(a)pyrene	0.2	MCL
Benzo(b)fluoranthene	0.1†	PQL
Bis(2-ethylhexyl)phthalate	6	MCL
Carbazole	1.8	HH (c)
Dibenz(a,h)anthracene	0.1†	PQL
Indeno(1,2,3-cd)pyrene	0.1†	PQL
Methylnaphthalene (2-)	10	HH (nc)
Methylphenol (4-)	49	HH (nc)
Naphthalene	15	HH (nc)

Notes:

1. Recommended groundwater Preliminary Remediation Goals (PRGs) are in micrograms per liter (µg/l), which are equivalent to parts per billion (ppb), unless otherwise noted. pH is given in standard units (su).

2. Basis for PRGs includes the ARARs: USEPA Safe Drinking Water Act (SDWA) and Maximum Contaminant Levels (MCLs).

3. “HH (c)” indicates the PRG is based on potential carcinogenic human health-based risk.

4. “HH (nc)” indicates the PRG is based on potential non-carcinogenic hazard to human health.

5. "HH (IEUBK)" indicates the PRG is based on potential human health-based risk as indicated by the USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) model.

6. "SMCL" indicates the pH PRG of < 8.5 s.u. is based on the Secondary MCL range of 6.5 - 8.5 s.u.

7. "†" indicates that the PRG is based on a practical quantitation limit (PQL) of 0.1 µg/L.

8. Further discussion on the basis/development of groundwater PRGs is provided in Appendix B-3.

TABLE 5
Contaminants of Concern which have Recommended Preliminary Remediation Goals for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Contaminants of Concern (COCs)	ARAR	Recommended PRG
Metals/Inorganics		
Asbestos	X	Less than 1%; would not contribute to a cumulative ILCR > 1E-04 through inhalation pathway

Notes:

"X" indicates selection as COC.

TABLE 6A
Contaminants of Concern for Surface Water
Feasibility Study
Blackburn Union Privileges Superfund Site
Walpole, Massachusetts

Contaminant of Concern (COC)	Human Health Risk	ARARs	
		Exceeds USEPA Freshwater Aquatic Life[&] NRWQC	Exceeds Massachusetts Surface Water Quality Regulations
Metals/Inorganics[@]			
Aluminum[#]		X	
Copper[$]		X	
Lead[$]		X	
pH (elevated)	X	X	X

Notes:

1. "X" indicates selection as COC.

2. pH was the only surface water COC selected based on human health risk (based on an exceedance of screening criteria, not calculated hazard) as presented in Table B-3.1 Summary of Potentially Actionable Human Health Risks, included in Appendix B-3.

3. No actionable ecological risks were identified based on the Baseline Ecological Risk Assessment (BERA). Refer to Table 2, Perspective on Actionable Ecological Risks.

4. "[&]" indicates that the National Recommended Water Quality Criteria (NRWQC) used for comparison to Site concentrations is the "Freshwater CCC" (Criterion Continuous Concentration) or freshwater chronic exposure value.

5. "[@]" indicates that dissolved metals concentrations (as opposed to total) are compared to the NRWQC.

6. "[#]" indicates the aluminum NRWQC is expressed as total recoverable metal.

7. "[$]" indicates consistent with the BERA, a hardness of 44 mg/l ($CaCO_3$ equivalent) for the Neponset River is assumed for hardness dependant NRWQC (copper and lead).

8. Massachusetts Surface Water Quality Regulations refers to 314 CMR 4.05(3)(b), Class B waters (Neponset River classification).

TABLE 6B
Recommended Surface Water Preliminary Remediation Goals
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Contaminant of Concern	Recommended Surface Water PRG (Concentrations in µg/l unless otherwise noted)	Basis for Recommended PRG
Inorganics/Metals[@]		
Aluminum[#]	87	NRWQC - Freshwater Aquatic Life
Copper[$]	4.4	NRWQC - Freshwater Aquatic Life
Lead[$]	1.0	NRWQC - Freshwater Aquatic Life
pH (elevated)	6.5 - 8.3	Massachusetts Surface Water Quality Regulations

Notes:

1. Recommended surface water PRGs are in micrograms per liter (µg/l), which are equivalent to parts per billion (ppb), unless otherwise noted. pH is given in standard units (su).

2. Basis for PRGs includes: National Recommended Water Quality Criteria (NRWQC). "NRWQC – Freshwater Aquatic Life" refers to "Freshwater CCC" (Criterion Continuous Concentration) or freshwater chronic exposure value; or the Massachusetts Surface Water Quality Regulations [314 CMR 4.05(3)(b)].

3. "[@]" indicates that dissolved (as opposed to total) metals concentrations are compared to the NRWQC.

4. "[#]" indicates the aluminum NRWQC is expressed as total recoverable metal.

5. "[$]" indicates consistent with the BERA, a hardness of 44 mg/l ($CaCO_3$ equivalent) for the Neponset River is assumed for hardness dependant NRWQC (copper and lead).

6. Further discussion on the basis/development of surface water PRGs is provided in Table 6A.

TABLE 7
Preliminary Remediation Goals for Soil in the Area of Containment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Contaminants of Concern (COCs)	Recommended PRG
Asbestos	Less than 1%; would not contribute to a cumulative ILCR > 1E-04 through inhalation pathway
pH	Greater than 2 and less than 12.5
Other Contaminants[1]	Prevent Exposure to Contaminated Soil

Notes:

1. The AOC was covered under the previous CERCLA removal action and was not evaluated in the risk assessment. It is acknowledged that an assessment of risk to human health or the environment would indicate potential risk. Therefore, contaminants of concern (COCs) other than asbestos and pH have not been identified, nor have chemical-specific PRGs for AOC soils been established.

TABLE 8
Remedial Action Objectives and General Response Actions
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Media	Risk Type	Remedial Action Objectives	General Response Actions
Groundwater/ Surface Water	Human Health	Prevent ingestion/dermal contact/inhalation by a future resident with groundwater used as a domestic water supply having COC concentrations that exceed MCLs or result in cumulative excess cancer risk > 1E-04, non-carcinogenic HI > 1, or PBL > 5%, or where pH conditions are elevated; and meet ARARs	No Action Limited Action/Monitoring Containment In-Situ Treatment Ex-Situ Treatment Removal
		Prevent dermal contact by a future construction worker with groundwater having elevated pH conditions, and meet ARARs	
		Prevent dermal contact by a current/future wader with surface water having elevated pH conditions, and meet ARARs	
		Prevent migration of contaminated groundwater beyond the compliance boundaries for the SO and AOC waste management areas. (Note that the SO waste management area refers to soils to the East of South Street, including the Old Railroad right-of-way.)	
	Ecological	Surface water concentrations shall meet ARARs	
Soil	Human Health	Prevent ingestion of soil by a future resident/construction worker with lead concentrations resulting in PBL > 5%, and meet ARARs	No Action Limited Action/Monitoring Containment In-Situ Treatment Ex-Situ Treatment Removal
		Prevent ingestion/dermal contact by a future resident with soil having COC concentrations which result in cumulative excess cancer risk > 1E-04 or non-carcinogenic HI > 1, and meet ARARs	
		Prevent inhalation of asbestos fibers from soil having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from soil which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs.	
		Prevent non residential exposure to contaminated soils in the Area of Containment that would result in unacceptable levels of risk to a future human receptor and meet ARARs	
	Ecological	Prevent exposure to contaminated soil in the Area of Containment that would result in unacceptable levels of risk to an ecological receptor	
Sediment	Human Health	Prevent inhalation of asbestos fibers from sediment having asbestos concentrations greater than or equal to 1%; prevent exposure to asbestos fibers from sediment which would contribute to a cumulative ILCR of > 1E-04 through the inhalation pathway; meet ARARs.	No Action Limited Action/Monitoring Containment In-Situ Treatment Ex-Situ Treatment Removal
Soil Vapor	Human Health	Prevent inhalation of indoor air that is impacted by soil vapor and has resultant COC concentrations which result in a cumulative excess cancer risk >1E-4 or non-carcinogenic HI>1, and meet ARARs.	No Action Limited Action/Monitoring Containment Extraction / Removal / Collection HVAC Modifications Building Repairs

TABLE 9A
Screening of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
No Action	None	None	No Action	Required for consideration under NCP as a baseline for evaluation.	Yes
Limited Action	Use Restrictions	Deed Restriction	Prevent groundwater below property from being used as a potable water supply	Potentially applicable.	Yes
	Access Restrictions	Fencing and Security Measures	Limit physical access to specific areas of the Site to prevent public exposure to surface water.	Potentially applicable.	Yes
	Monitoring	Monitored Natural Attenuation	Monitoring of existing natural subsurface processes such as dilution, dispersion, precipitation, adsorption, volatilization, and biodegradation, which reduce the mobility, toxicity and/or mass of contaminants in groundwater and surface water.	Potentially applicable.	Yes
		Long-Term Monitoring	Monitoring to make sure contaminated groundwater is not migrating beyond the compliance boundary for the waste management areas.	Potentially Applicable	Yes
Containment	Vertical Barrier Wall	Sheet Piling	A subsurface barrier wall arranged to contain the plume area.	Not applicable. Not possible to drive piling through dense glacial till soils or bedrock.	No
		Slurry Wall	A subsurface barrier wall composed of bentonite and soil, and configured to contain the plume area.	Potentially applicable in upper aquifer. Potentially implementable for glacial till, but depth of contamination and density of glacial till may be limiting factors. Not feasible for bedrock installation.	Yes
		Pressure Grouting	A subsurface containment wall constructed from pressure injected grout; injections are arranged to form a barrier wall to contain the plume.	Not implementable due to infeasibility of grout injection in dense glacial till and bedrock.	No
	Collection	Extraction Wells	Extraction of groundwater, possibly enhanced by hydrofracturing/pneumatic fracturing to intercept/contain plume. Typically followed by ex-situ treatment.	Potentially applicable; however, very low hydraulic conductivities may render extraction from source area technically impracticable. Pilot testing would be required.	Yes
		Collection Trench	High hydraulic conductivity trenches constructed to intercept and collect contaminated groundwater. Typically followed by ex-situ treatment.	Potentially applicable in upper aquifer; however, the depth of contamination renders a collection trench in the vicinity of the source area infeasible.	Yes
		Soil Excavation	Excavate contaminated soils in source area.	Potentially applicable; however, the depth of contamination and site geology may be cost prohibitive or render excavation technically infeasible. Further, the high pH fluids that would be encountered during the excavation could pose significant difficulties in managing excavated fluids/soils.	Yes

TABLE 9A
Screening of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
Containment (continued)	Cap/Cover	Asphalt/Concrete	Layer of asphalt or concrete installed over contaminated soils to limit potential infiltration of precipitation, which may leach contaminants into groundwater.	Potentially applicable in source area; however, significant portions of contaminated soils and high pH conditions already reside below the groundwater table.	Yes
		Composite Cap	Multi-layered cap consisting of synthetic liner and other layers.	Potentially applicable to area currently capped with synthetic liner; however, significant portions of contaminated soils and high pH conditions already reside below the groundwater table.	Yes
		Soil/Vegetative Cap	Layer of soil/vegetation installed over contaminated surface water/wetland environments to change the characteristics of the surface water/wetland environment to preclude the presence of surface water.	Potentially applicable to the Former Mill Tailrace.	Yes
In-situ Treatment	Biological Treatment	Phytoremediation	Use of plants to remove, transfer, stabilize and/or destroy inorganic and organic contamination in groundwater.	Not applicable considering the presence of high pH groundwater at depth.	No
		Enhanced Biodegradation	Addition of amendments, such as oxygen and other electron acceptors, electron donors, cometabolites, and/or nutrients, to the subsurface to enhance or stimulate contaminant degradation by existing microorganisms.	Not implementable. High pH is toxic to microorganisms. Also, metals (which are not biodegradable) are primary contaminants.	No
		Bioaugmentation	Addition of non-native or augmented microorganisms to the subsurface suited to specific geochemistry and able to degrade specific contaminant types.	Not implementable. High pH is toxic to microorganisms. Also, metals (which are not biodegradable) are primary contaminants.	No
	Physical Treatment	Sparging	A method where air, oxygen or other gas, such as CO_2, is injected into groundwater to volatilize and remove organic contaminants or change pH conditions.	Potentially applicable: Technology is typically not effective for metals. Limited available track record for neutralization of high pH groundwater with CO_2. Would likely cause fouling due to precipitates (e.g., carbonates).	Yes
		In-Well Stripping	A method where groundwater is circulated within a vertical well to volatilize and remove organic contaminants.	Not implementable. High iron concentrations would rapidly foul wells. Would likely not be effective at reducing concentrations of several of the metals (e.g., Pb, Cr, V, Al, etc.)	No
		Electrokinetic Separation	A low-intensity direct current is applied between an array of electrodes installed in low permeability, saturated contaminated soils causing polar organic compounds and metal ions to move toward the electrodes, where they are removed by precipitation, electroplating, or pumping of water at the electrodes.	Not applicable. Insufficient track record. Would require extensive bench-scale and pilot testing.	No

TABLE 9A
Screening of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
In-situ Treatment (continued)	Physical Treatment (continued)	Thermal Treatment	Heat is added to the subsurface, typically by electrical resistive heating, microwave, or steam injection to enhance volatilization of organic contaminants.	Not applicable. The extent of organic contamination does not warrant this technology. Generally not effective on metals.	No
		Hydrofracturing	A high pressure mixture of water, chemicals, and porous media that is injected into low permeability soils (i.e. glacial till) to fracture the soil matrix and create higher permeability pathways through which chemicals can be introduced or groundwater extracted.	Not applicable due to concerns with potentially enhancing contaminant migration.	No
	Chemical Treatment	Permeable Reactive Barriers	A barrier of reactive materials utilizing sorption, precipitation, or degradation to treat contaminants that pass through the barrier by groundwater advection.	Potentially applicable; however, significant bench-scale and/or pilot testing would be required. Multiple PRBs would likely be required to address the contaminants of concern in Site groundwater.	Yes
		Neutralization	The introduction of chemicals to groundwater to reduce the pH within the aquifer. Possible chemicals include: carbon dioxide gas, acid (HCl), air, etc.	Potentially applicable: Bench-scale and/or pilot testing would be required. Limited available track record for addressing high pH groundwater. Would likely cause fouling due to precipitation (e.g., carbonates).	Yes
		Catalytic Decomposition	The introduction of various oxides of cobalt, nickel, magnesium, or titanium are used to degrade sodium hypochlorite. The secondary effect of the chemical reaction results in acidic pH conditions.	Not applicable. Unproven technology. Further, the addition of metals and/or sodium hypochlorite could cause exceedances of groundwater quality standards and potential fouling of the aquifer could occur due to pH adjustment. Significant bench-scale and/or pilot testing would be required.	No
		Chemical Oxidation	The introduction of chemicals to groundwater to oxidize and destroy organic contaminants.	Not applicable. The extent of organic contamination does not warrant this technology. May have effect of mobilizing some metals (e.g., Cr, V, etc.)	No
		Chemical Reduction	The introduction of chemicals to groundwater to reduce metal contaminants to insoluble, less mobile precipitates. Potential chemicals include: dithionite, soluble sulfides (e.g., NaS, etc.)	Not applicable. May have effect of mobilizing some metals (e.g., Fe, Mn, As, etc.). Bench-scale testing would be required to select appropriate reductant.	No
Ex-situ Treatment	Biological Treatment	Aerobic Bioreactor	Extracted groundwater is treated within an aerated tank containing microorganisms, which oxidize or degrade organic contaminants. Usually followed by clarification or filtration for removal of suspended solids.	Not applicable. The concentrations of organic contaminants are not high enough to warrant this technology.	No
	Physical Treatment	Air Stripping	Air is passed through extracted groundwater to volatilize (strip) contaminants, typically organic compounds, from solution.	Potentially applicable for removal of VOCs. May result in precipitation of metals and fouling of equipment. Pilot and bench scale testing would be required.	Yes

TABLE 9A
Screening of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
Ex-situ Treatment (continued)	Physical Treatment (continued)	Adsorption	Extracted groundwater is passed through sorbents, such as GAC/greensand, where contaminants are removed from solution by adsorption. Most adsorption media require periodic reactivation or change-out.	GAC is potentially applicable to organic contaminants, and to a more limited extent, some metals. Green sand may be effective at removing some of the metals. Pilot testing would be required for extraction. Bench-scale testing would be required to select appropriate adsorption media.	Yes
	Chemical Treatment	Coagulation/ Flocculation/ Precipitation	Chemicals, including air, are added to extracted groundwater to promote the precipitation and settling of metal contaminants from solution.	Potentially applicable. Pilot testing of would be required for extraction. Bench-scale testing would be required to determine appropriate chemical dosage and target pH.	Yes
		Ion Exchange	Extracted groundwater is passed through a porous resin, which exchanges sorbed ions for target contaminant ions.	Potentially applicable. Pilot testing would be required for extraction. Bench-scale scale testing would be required to select appropriate resin.	Yes
		Neutralization	The introduction of chemicals to extracted groundwater to reduce the pH. Possible chemicals include: carbon dioxide gas, acids (e.g., HCl), air, etc.	Potentially applicable. Pilot testing would be required for extraction. Bench-scale testing would be required.	Yes
		Chemical Reduction	Chemicals are added to extracted groundwater to reduce metal contaminants. Potential chemicals include: dithionite, soluble sulfides (e.g., NaS), etc.	Not applicable. The pH condition in groundwater would require significant bench-scale testing would be required to determine reducing agent and dosage.	No
		Chemical Oxidation	Typically, a combination of chemical oxidizers and UV light are used to oxidize and destroy organic contaminants.	Not applicable. The concentrations of organic contaminants are not high enough to warrant this technology.	No
		Electrochemical Methods	Oppositely charged electrodes are submerged in extracted groundwater, wherein chemical oxidation-reduction reactions take place at the electrodes.	Not applicable. This technology does not have a track record of successful implementation.	No
Removal	On-site Discharge	Groundwater Recharge Wells or Basins	After treatment by biological, chemical, or physical methods, groundwater is returned to the aquifer from which it was extracted via groundwater recharge wells.	Potentially applicable. Pilot testing would be required. Compliance with substantiative standards for recharge/injection would be required. Fouling of recharge wells/basins may be a significant problem.	Yes
	Off-site Discharge	Surface Water	After treatment by biological, chemical, or physical methods, groundwater is discharged to a surface water body (usually a river).	Potentially applicable. Compliance with substantiative standards for surface water discharges would be required.	Yes
		POTW	After treatment by biological, chemical, or physical methods, groundwater is discharged to the local publicly-owned treatment works (POTW) via pipe networks.	Potentially applicable. Compliance with ARARs for discharging to POTW would be required.	Yes

TABLE 9A
Screening of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
Removal (continued)	Off-site Discharge (continued)	Transport to POTW	After treatment by biological, chemical, or physical methods, groundwater is transported to the local publicly-owned treatment works via tanker truck for treatment.	Potentially applicable. Compliance with ARARs for discharging to POTW would be required.	Yes

TABLE 9B
Screening of Remedial Technology Process Options for Soil
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
No Action	None	None	No actions taken.	Required for consideration under NCP as a baseline for evaluation.	Yes
Limited Action	Use Restrictions	Deed Restrictions	Restrict future site usage to minimize contact with soils.	Potentially applicable.	Yes
	Access Restrictions	Fencing and Security Measures	Limit physical access to the specific areas of the Site to prevent public exposure to soils.	Potentially applicable.	Yes
	Monitoring	Long-Term Monitoring	Monitoring of wastes left in place to determine the protectiveness of the remedy.	Potentially applicable	Yes
		Monitored Natural Attenuation	Monitoring of existing natural subsurface processes such as adsorption, volatilization, and biodegradation, which reduce the mobility, toxicity and/or mass of contaminants in soil.	Not applicable. Generally not effective for relatively non-volatile, non-biodegradable COCs (e.g., metals, heavy PAHs, and asbestos)	No
Containment	Cap/Cover	Asphalt/Concrete	Layer of asphalt or concrete installed over contaminated soils to limit potential for direct contact with contaminated soil.	Potentially applicable.	Yes
		Soil	Layer of soil installed over contaminated soil to limit potential for direct contact with contaminated soil.	Potentially applicable.	Yes
		Composite Cap	Multi-layered cap consisting of a synthetic liner and other layers.	Potentially applicable.	Yes
		Horizontal Grouting	Inject grout below the waste to create a bottom seal limiting the downward migration of leachate.	Technology has limited application for environmental remediation. Much of contaminated soil is already below the groundwater table.	No
In-situ Treatment	Biological	Bioaugmentation	Addition of non-native or augmented microorganisms to the subsurface suited to specific geochemistry and able to degrade specific contaminant types.	Not applicable. High pH is toxic to microorganisms. Generally not effective for metals.	No
		Enhanced Biodegradation	Addition of amendments, such as oxygen and other electron acceptors, electron donors, cometabolites, and/or nutrients, to the subsurface to enhance or stimulate contaminant degradation by existing microorganisms.	Not applicable. High pH is toxic to microorganisms. Generally not effective for metals.	No

TABLE 9B
Screening of Remedial Technology Process Options for Soil
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
In-situ Treatment (continued)	Biological (continued)	Phytoremediation	Use of plants to remove, transfer, stabilize and/or destroy inorganic and organic contamination in soil.	Not applicable due to depth of contamination. High pH is generally toxic to plants.	No
	Physical/ Chemical	Soil Flushing	Surfactant/cosolvent solutions are applied to soil using an injection or infiltration system to solubilize organic contaminants in groundwater, which is then extracted and treated.	Would be difficult to distribute solutions effectively to targeted areas and capture solubilized contaminants. Generally not effective for metals and asbestos.	No
		Solidification/ Stabilization	Treatment agents are applied and mixed into contaminated soil using auger/caisson or injector head systems to physically or chemically immobilize metals, which in turn decreases transfer of metals from soils to groundwater. Vitrification uses extreme heat to melt soils to physically immobilize metals.	Potentially applicable dependant upon the volumes of soil to be treated. Debris in contaminated soils may complicate implementation of this option.	Yes
		Electrokinesis	A low-intensity direct current is applied between an array of electrodes installed in low permeability, saturated contaminated soils causing polar organic compounds and metal ions to move toward the electrodes, where they are removed by precipitation, electroplating or pumping of water at the electrodes.	Not implementable. Insufficient track record. Extensive bench and pilot testing would be required to evaluate required current intensity, probe spacing, amendments, and byproduct formation.	No
		Electroacoustic Soil Decontamination	Removes heavy metals from soils through direct current electrical and acoustic fields. Direct current facilitates liquid transport through soils.	Not implementable. Insufficient track record. Extensive bench and pilot testing would be required to evaluate required electral/accoustic field intensity, probe spacing, amendments, and byproduct formation. Further, while this technology could be effective for some site contaminants, the remaining contaminants would require additional treatment technologies.	No

TABLE 9B
Screening of Remedial Technology Process Options for Soil
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
In-situ Treatment (continued)	Physical/ Chemical (continued)	Hydraulic Fracturing	Injection of pressurized water through wells cracks low permeability soil/rock. Cracks are filled with porous media that serve as substrates for bioremediation or to improve pumping efficiency.	Not applicable. Most effective for deeper soil remediation zones where permeability is a problem. May enhance high pH migration. This technology provides a mechanism to increase permeability of lower permeability materials; additional remedial technologies are then required to address the COCs in these materials.	No
	Thermal	Thermal Desorption	Family of technologies, such as thermal blankets, hot air/steam injection, and electrical resistance heating, that heat subsurface soils to desorb organic contaminants. Used in conjunction with soil vapor extraction.	Not applicable due to limited organic contaminants present. Generally not effective for metals and asbestos.	No
Ex-situ Treatment	Biological	Biopile/Bioreactor	Biological degradation of organic contaminants using indigenous or engineered microorganisms.	Generally not effective for metals or asbestos.	No
	Physical/ Chemical	Solidification/ Stabilization	Treatment agents are applied and mixed into contaminated soil to physically or chemically immobilize metals. Vitrification uses extreme heat to melt soils to physically immobilize metals. May also be used prior to off-site shipment to prevent mobility of contaminants.	Potentially applicable. Bench-scale testing would be required to determine suitable treatment agents.	Yes
		Chemical Oxidation/ Reduction	Oxidation/reduction chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Other treatment technologies are more cost-effective with equivalent mitigation of risks for site COCs. Some metals mobility enhanced under oxidizing conditions (e.g., Cr, V); others under reducing conditions (e.g., Fe, Mn, As). Remediation might require both treatment processes.	No
		Soil Washing	Separation of fine particles containing sorbed contaminants from bulk excavated soil using wash water, which may contain surfactant, acid, base or chelating agent. The wash water requires further treatment or disposal.	Potentially applicable. Bench testing required to determine suitable treatment agents.	Yes

TABLE 9B
Screening of Remedial Technology Process Options for Soil
Feasibility Study
Blackburn and Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
Ex-situ Treatment (continued)		Chemical Extraction	Extraction of contaminants from screened, excavated soils using acid/chelating agents or solvent to remove heavy metal and organic contaminants, respectively.	Potentially applicable. Bench-scale testing would be required to determine suitable treatment agents. Generally not effective for asbestos.	Yes
	Thermal	Thermal Desorption	Transfer (desorption) of water and organic contaminants from excavated soil to a carrier gas, which is treated using condensation, granular activated carbon and/or thermal oxidation.	Generally not effective for metals or asbestos.	No
		Incineration	Excavated soils are heated to high temperatures (1,400 to 2,200 F) to combust (destroy) organic contaminants. Combustion gases and residuals may require treatment for removal of particulates and acid gases.	Generally not effective for metals.	No
		Pyrolysis	Removal of contaminants through induction of chemical decomposition in organic materials by heat in the absence of oxygen.	Other treatment technologies are more cost-effective with equivalent mitigation of risks for site organic COCs. Generally not effective for metals.	No
		Pyrometallurgical Extraction	Utilizes elevated temperature extraction and processing for removal of metals from contaminated soils. Soils are treated in a high temperature furnace to remove volatile metals from the solid phase.	Technology is primarily used for volatile metals (e.g., mercury). Generally not effective for less volatile metals. Other processes are more effective for organics in soil.	No
Removal	Excavation	Excavation	Removal of soil from subsurface for ex-situ treatment or disposal.	Potentially applicable. Could be used in conjunction with ex-situ technologies.	Yes
	Disposal	On-site Disposal	Excavated soils are consolidated on-site. The lining and cap typically consist of synthetic material.	Potentially applicable.	Yes
		Off-site Disposal	Excavated material transported off-site to permitted facility.	Potentially applicable.	Yes

TABLE 9C
Screening of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
No Action	None	None	No actions taken.	Required for consideration under NCP as a baseline for evaluation.	Yes
Limited Action	Use Restrictions	Deed Restrictions	Restrict future site usage to minimize contact with sediments.	Potentially applicable.	Yes
	Monitoring	Long-Term Monitoring	Monitoring of contamination left in sediment to determine the protectiveness of the remedy	Potentially applicable	Yes
		Monitored Natural Recovery	Monitoring of existing natural processes such as dilution, dispersion, adsorption, volatilization, and biodegradation, which reduce the mobility, toxicity and/or mass of contaminants in sediment.	Not applicable. Generally not effective for asbestos.	No
	Biota Management	Habitat Modification	Modify habitat by creating or erecting barriers to minimize contact by biota with contaminated sediments.	Not applicable. No actionable ecological risk. Does not address asbestos-impacted sediment.	No
		Relocation	Relocate affected population to off-site habitat.	Not applicable. No actionable ecological risk. Does not address asbestos-impacted sediment.	No
Containment	Cap/Cover	Aqueous Cap	Water level is maintained over contaminated sediments to address direct contact via inhalation and exposure to contaminated sediments above risk levels. Includes long-term O & M of a dam which maintains water levels.	Potentially applicable.	Yes
		Engineered Sub-Aqueous Cap	Capping materials are applied directly over contaminated sediments to create a barrier between contamination and receptors.	Potentially applicable, however, ecological impacts and flood storage issues would need to be considered.	Yes
		Natural Sub-Aqueous Cap	Clean local sediments are applied directly over contaminated sediments to create a barrier between contamination and receptors.	Potentially applicable, however, ecological impacts and flood storage issues would need to be considered.	Yes
	Vertical Containment	Vertical Containment	Low permeability subsurface wall (e.g. slurry wall, sheet piling, cast-in-place concrete wall, vertical geomembrane, or pressure grouting) encircling contaminated sediments.	Although effective in reducing lateral migration of contaminants, would need to be combined with a cap to address asbestos-impacted sediments.	No

TABLE 9C
Screening of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
In-situ Treatment	Biological	Bioaugmentation	Addition of non-native or augmented microorganisms to the subsurface suited to specific geochemistry and able to degrade specific contaminant types.	Not applicable for asbestos impacted sediments	No
		Enhanced Biodegradation	Addition of amendments, such as oxygen and other electron acceptors, electron donors, cometabolites, and/or nutrients, to the subsurface to enhance or stimulate contaminant degradation by existing microorganisms.	Not applicable for asbestos impacted sediments	No
		Phytoremediation	Use of plants to remove, transfer, stabilize and/or destroy inorganic and organic contamination in sediment.	Not applicable for asbestos impacted sediments	No
	Physical/ Chemical	Solidification/ Stabilization	Treatment agents are applied and mixed into contaminated sediment to physically or chemically immobilize contaminants.	Potentially applicable; however, ecological impacts would need to be considered	Yes
		Electroacoustic Soil Decontamination	Removes heavy metals from sediments through direct current electrical and acoustic fields. Direct current facilitates liquid transport through sediments. The technology consists of electrodes, an anode and a cathode, and an acoustic source.	Not applicable for asbestos impacted sediments	No
		Electrokinetic Processes	Application of a low current to electrodes in the subsurface in order to mobilize contaminant in two ways: (1) in the form of charged species (electrolysis); or (2) by causing an imbalance of charge bonds in clayey material, which results in clay compaction and chemical desorption (electro-osmosis).	Not applicable for asbestos impacted sediments	No
		Hydraulic and Pneumatic Fracturing	Injection of pressurized water through wells cracks low permeability and over-consolidated sediments. Cracks are filled with porous media that serve as substrates for bioremediation or to improve pumping efficiency.	Not applicable. Permeability of sediment not of concern at this Site. In addition, technologies which would use this process option to enhance treatment effectiveness have been screened out.	No
Ex-situ Treatment	Biological	Biopile/ Bioreactor	Biological degradation of organic contaminants using indigenous or engineered microorganisms.	Not applicable for asbestos impacted sediments	No
		Composting	Contaminated sediment is excavated and mixed with bulking agents and organic amendments such as wood chips, hay, manure, and vegetative (e.g., potato) wastes. Proper amendment selection provides adequate porosity and a balance of carbon and nitrogen to degrade contaminants to non-toxic products.	Not applicable for asbestos impacted sediments	No

TABLE 9C
Screening of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
Ex-situ Treatment (continued)	Biological (continued)	Fungal Degradation	Fungal biodegradation refers to the degradation of a wide variety of organopollutants by adding lignin-degrading or wood-rotting enzymes.	Not applicable for asbestos impacted sediments	No
		Land Treatment	Treatment of contaminants through dynamic interactions of wastes with sediment, climate, and biological activity. Wastes are tilled periodically to create aeration.	Not applicable for asbestos impacted sediments	No
	Physical/ Chemical	Solidification/ Stabilization	Treatment agents are applied and mixed into contaminated sediment to physically or chemically immobilize contaminants. May also be used prior to off-site shipment to prevent mobility of contaminants.	Potentially applicable. Bench-scale testing would be required to determine suitable treatment agents. (See comments about dredging)	Yes
		Soil Washing	Separation of fine particles (asbestos containing fraction) from bulk dredged sediment using wash water, which may contain surfactant, or other agent. The wash water requires further treatment or disposal.	Potentially applicable. Bench-scale testing would be required to determine suitable treatment agents. (See comments about dredging)	Yes
		Chemical Extraction	Extraction of contaminants from screened, dredged sediment using acid or solvent to remove heavy metal and organic contaminants, respectively.	Not applicable for asbestos impacted sediments	No
		Chemical Oxidation/ Reduction	Oxidation/reduction chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Not applicable for asbestos impacted sediments	No
		Dehalogenation	Reagents are added to sediments contaminated with halogenated organics. The dehalogenation process is achieved by either the replacement of the halogen molecules or the decomposition and partial volatilization of the contaminants.	Not applicable for asbestos impacted sediments	No
	Thermal	Thermal Desorption	Transfer (desorption) of water and organic contaminants from dredged sediment to a carrier gas, which is treated using condensation, granular activated carbon and/or thermal oxidation.	Not applicable for asbestos impacted sediments	No
		Pyrolysis	Removal of contaminants through induction of chemical decomposition in organic materials by heat in the absence of oxygen.	Not applicable for asbestos impacted sediments	No

TABLE 9C
Screening of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
Ex-situ Treatment (continued)	Thermal (continued)	Pyrometallurgical Extraction	Utilizes elevated temperature extraction and processing for removal of metals from contaminated soils. Soils are treated in a high temperature furnace to remove volatile metals from the solid phase.	Technology is primarily used for volatile metals (e.g., mercury), and application to asbestos is untested. Other processes are more effective for asbestos in sediments.	No
		Incineration	Dredged sediments are heated to high temperatures (1,400 to 2,200 F) to combust (destroy) organic contaminants. Combustion gases and residuals may require treatment for removal of particulates and acid gases.	Technology is primary used for organic contaminants, and application to asbestos is untested. Other processes are more effective for asbestos in sediment.	No
Removal	Excavation	Dredging	Removal of sediment for ex-situ treatment or disposal.	Potentially applicable, however, there could be ecological damage associated with dredging. Could be used in conjunction with ex-situ technologies.	Yes
		Dry Excavation	Removal of sediments by diverting/dewatering surface water in area of excavation.	Potentially applicable, however, there could be ecological damage associated with dry excavation. Could be used in conjunction with ex-situ technologies.	Yes
	Disposal	On-site Disposal	Dredged/excavated sediments are placed in a lined and capped cell located on-site. The lining and cap typically consist of synthetic material.	Potentially applicable.	Yes
		Off-site Disposal	Dredged/excavated material transported off-site to permitted facility.	Potentially applicable.	Yes

TABLE 9D
Screening of Potential Remedial Technology Process Options for Soil Vapor
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Description	Screening Comments	Retained for Further Evaluation
No Action	None	None	No actions taken.	Required for consideration under NCP as a baseline for evaluation.	Yes
Limited Action	Use Restrictions	Deed Restrictions	Restrict future site usage to prevent location of structures over areas of risk, or add vapor mitigation, as necessary.	Potentially applicable.	Yes
	Monitoring	Vapor and Indoor Air Sampling	Collect soil vapor samples and indoor air samples periodically to monitor contaminant concentrations.	Potentially applicable.	Yes
Containment	Horizontal Barriers	Concrete Slab	Layer of concrete, usually a building floor slab, installed over contaminated soils to limit potential for vapor migration indoors.	Potentially applicable. Use in conjunction with monitoring.	Yes
		Geomembrane	Polyethylene sheeting or cold-spray product (e.g. Liquid Boot) installed over contaminated soil to limit potential for vapor migration indoors. Used beneath a building floor slab.	Potentially applicable. Use in conjunction with monitoring.	Yes
	Vertical Barriers	Vertical Barriers	Low permeability subsurface wall encircling waste disposal areas to reduce soil vapor mobility. Usually accompanied by treatment of extracted gas and horizontal barrier.	Not effective in reducing risks to future receptors. Soil vapor extraction is significantly more cost effective than vertical barriers.	No
Extraction/ Removal/ Collection	Extraction	Soil Vapor Extraction	Inducement of air flow through unsaturated soils to extract soil vapor using horizontal or vertical extraction wells under a vacuum. Air flow rates are high. Extracted vapors are typically treated using granular activated carbon or thermal oxidation.	Potentially applicable. Use in conjunction with scheduled monitoring.	Yes
		Sub-Slab Depressurization	Passive or active inducement of air flow through unsaturated soils beneath a horizontal building slab/barrier to extract soil vapor using horizontal or vertical extraction wells under a vacuum. Air flow rates are the minimum required to reverse the pressure gradient across the building slab.	Potentially applicable. Use in conjunction with monitoring.	Yes
HVAC Modifications	Ventilation	Ventilation	HVAC equipment is installed in building to provide an increased number of fresh air exchanges relative to conventional systems to maintain indoor air concentrations at acceptable levels of risk.	Potentially applicable. Increased indoor air flow may increase mass flux of soil vapor indoors relative to ambient conditions. Use in conjunction with monitoring.	Yes
	Pressurization	Pressurization	HVAC equipment is installed in building to maintain a positive indoor air pressure using fresh air. Soil vapor will not migrate indoors as long as positive pressure is maintained.	Potentially applicable. Use in conjunction with monitoring.	Yes
Building Repairs	Sealing	Sealing	Locations in existing buildings that are potential pathways for soil vapor intrusion are sealed.	Potentially applicable. Use in conjunction with monitoring.	Yes

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
No Action	None	None	Does not achieve remedial action objectives.	Not applicable.	Low cost (Five Year Reviews)	Retained for baseline comparison purposes in accordance with the NCP.
Limited Action	Use Restrictions	Deed Restriction	Effectiveness depends on continued future enforcement. Does not reduce contamination.	Easily implemented; administratively feasible.	Low capital costs; low O&M costs.	Retained.
	Access Restrictions	Fencing and Security Measures	Moderately effective in reducing potential exposure. Does not reduce contamination.	Easily implemented. Would likely be used in conjunction with other process options.	Low capital costs; low O&M costs.	Retained.
	Monitoring	Monitored Natural Attenuation	Effective method for observing contaminant migration and attenuation via natural processes (biodegradation, dilution, etc.) and assessing the effectiveness of remedial action.	Readily implemented using existing and/or additional monitoring wells.	Low capital costs; moderate O&M costs.	Retained.
		Long-Term Monitoring	Effective method for evaluating whether contaminated groundwater is migrating beyond the compliance boundary	Readily implemented using existing and/or additional monitoring wells	Low capital costs; moderate O&M costs.	Retained
Containment	Vertical Barrier Wall	Slurry Wall	Effective in reducing mobility of contaminants. Groundwater collection/extraction would be required. Does not reduce contaminant mass without ex-situ treatment.	The depth of the bulk of groundwater contamination (approximately 50 ft bgs) and the density of the glacial till would likely pose difficulties for implementing a slurry wall in the vicinity of the DAPL groundwater plume.	High capital costs, moderate O&M costs.	Eliminated. Effectiveness would be dependent upon use of additional collection/treatment options. Implementability would be difficult. The costs for this option would be high relative to other collection options (e.g., extraction wells).

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Containment (continued)	Collection	Extraction Wells	Effective at removing groundwater contamination and managing migration of the groundwater plume. In order to reduce the toxicity of the contamination, ex-situ treatment would be required.	Potentially implementable; however, the low hydraulic conductivities of the glacial till (where the bulk of the groundwater plume occurs) may render extraction technically impracticable from this unit; extraction on shallower more permeable soils is implementable. Pilot testing would be required.	Moderate capital costs; moderate O&M costs	Retained.
		Collection Trench	Effective at removing groundwater contamination and managing migration of the groundwater plume. In order to reduce the toxicity of the contamination, ex-situ treatment would be required.	Potentially implementable. Pilot testing would be required.	Moderate capital costs; moderate O&M costs.	Retained.
		Soil Excavation	Effective at reducing potential for additional contaminants leaching from contaminated shallow soils near the water table into groundwater; however, this method is not effective in reducing existing dissolved-phase groundwater contamination.	The depth of the bulk of groundwater contamination (approximately 50 ft bgs), the potential necessity to excavate below the water table at these depths, and the density of the glacial till would likely pose difficulties for implementing soil excavation in the DAPL groundwater plume.	High capital costs, no O&M costs.	Eliminated. Implementation would be difficult in glacial till soils. The effectiveness of this option in remediating dissolve groundwater contaminants is questionable. The costs for this option would be high relative to other collection methods (e.g., extraction wells).

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Containment (continued)	Cap/Cover	Asphalt/ Concrete	Relatively effective in limiting additional leaching of contaminants from impacted vadose zone soils to groundwater. However, soil data from the Site suggest that the highest concentration of soil contamination is beneath the water table, and DAPL groundwater plume is in deeper glacial till and bedrock. Further, asphalt and concrete are susceptible to weathering and cracking. Does not reduce the volume or toxicity of existing groundwater contamination. Effectiveness dependent upon the integrity of the pavement.	Easily implemented. Would need to be combined with use restrictions and/or treatment options.	Moderate capital; low O&M.	Eliminated. Effectiveness of this process option is questionable at this site given the distribution of COCs.
		Composite Cap	Effective in limiting additional leaching of contaminants from impacted vadose zone soils to groundwater. However, soil data from the Site suggest that the highest concentration of soil contamination is beneath the water table, and DAPL groundwater plume is in deeper glacial till and bedrock. Does not reduce the volume or toxicity of existing groundwater contamination.	Easily implemented. Would need to be combined with use restrictions and/or treatment options.	High capital; low O&M.	Eliminated. Effectiveness of this process option is questionable at this site given the distribution of COCs.
		Soil/Vegetated Cap	Effective in eliminating surface water and hence removing the exposure pathway in surface water for potential receptors.	Easily implemented. Would need to be combined with the construction of a compensatory surface water/wetland environment elsewhere on-Site.	Moderate capital; low O & M	Eliminated. Not compliant with ARARs.

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
In-situ Treatment	Physical Treatment	Sparging	Limited effectiveness in reducing organic contaminants via air or oxygen sparging. Limited case studies are available that document the effectiveness of CO_2 sparging in reducing the pH of groundwater. Extensive pilot testing would be required to determine if CO_2 sparging would be effective in reducing pH of site groundwater. In addition, changing the pH of the groundwater could have secondary effects of mobilizing some metals and causing precipitates/fouling (e.g., by carbonates).	The location of the bulk of the groundwater contamination (e.g., within the low hydraulic conductivity glacial till and shallow bedrock) would likely pose significant difficulties in delivering gases to the subsurface in the groundwater COC source area. Could be impacted in shallow, more permeable soils. However, significant pilot testing would be required.	Moderate capital; moderate O&M.	Eliminated. Effectiveness is unproven, significant field testing would be required. The adjustment of pH could potentially mobilize metals that were previously immobile in groundwater and lead to fouling of injection wells/nearby aquifer.
	Chemical Treatment	Permeable Reactive Barriers (PRB)	Commonly effective in treatment of chlorinated solvents. Less certain effectiveness for petroleum-related hydrocarbons, metals, or high pH conditions. Would likely not be effective as a single PRB in reducing the mass and toxicity of groundwater contaminants; rather, multiple PRBs would likely be necessary in order to be effective in mitigating the various COCs at the Site. Pilot testing would be required.	The likely necessity of multiple PRBs would likely pose difficulties for implementing this remedial technology at the Site.	High capital; moderate O&M.	Eliminated. The effectiveness of this option for treatment of metals and pH adjustment is questionable. Implementing this option would likely require multiple PRBs and significant pilot testing. Further, the feasibility of implementing this option in glacial till soils is limited.

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
In-situ Treatment (continued)	Chemical Treatment (continued)	Neutralization	Limited case studies are available documenting the effectiveness of reducing groundwater pH in-situ. Pilot testing would be required. Changing the pH of groundwater could have secondary effects of mobilizing metals and causing precipitates/fouling (e.g., by carbonates).	The location of the bulk of the groundwater contamination (e.g., within the low hydraulic conductivity glacial till and shallow bedrock) would likely pose significant difficulties in delivering chemicals to the subsurface in the groundwater COC source area. Could be implemented in shallow, more permeable soils. However, significant pilot testing would be required.	Moderate capital; moderate O&M.	Eliminated. Effectiveness is unproven, significant pilot testing would be required. The adjustment of pH could potentially mobilize metals that were previously immobile in groundwater and lead to fouling of injection wells/nearby aquifer. Implementing this option in the dense source area would be infeasible due to the difficulty of delivering neutralizing agents to the glacial till soils in this area.
Ex-situ Treatment	Physical Treatment	Air Stripping	Well-developed, widely used technology that is effective for removal of most VOCs dissolved in groundwater. Pre- and/or post-treatment may be necessary for metals and hardness, or to achieve discharge limits. Does not destroy contaminants. Off-gas may require treatment.	Readily implemented using conventional, commercially available equipment.	Low Capital; low to moderate O&M	Retained. However, other physical treatment process options (e.g., adsorption) are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.
		Adsorption	Well-developed, widely used technology. GAC is effective for removal of VOCs and SVOCs, and green sand is effective at removing some metals dissolved in groundwater. Pre- or post-treatment may be necessary for metals removal. Commonly used as a polishing step following air stripping. Contaminants are not destroyed, but transferred to the adsorptive media. Spent media may require disposal or reactivation as a hazardous waste.	Readily implemented using conventional, commercially available equipment.	Moderate capital; low to high O&M depending on frequency of media changeouts.	Retained.

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Ex-situ Treatment (continued)	Chemical Treatment	Coagulation/ Flocculation/ Precipitation	Well-developed, widely used technology for removal of dissolved metal ions from groundwater. Potentially applicable for pre- or post-treatment of Site groundwater for removal of metals in conjunction with other treatment of organics. Bench scale testing would be required to determine appropriate chemical dosages and target pH range for metals removal. Generates sludge that may require further treatment prior to disposal.	Readily implemented using existing and/or additional monitoring wells.	High capital; moderate to high O&M dependent upon the quantity and nature of sludge generated.	Retained.
		Ion Exchange	Well-developed, widely used technology for a variety of contaminants. Potentially applicable for pre- or post-treatment of groundwater for removal of metals in conjunction with treatment of organics. Bench scale testing would be required to select appropriate resin.	Readily implemented using conventional, commercially available equipment.	Moderate capital; moderate to high O&M dependent upon the resin selected.	Retained.

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Ex-situ Treatment (continued)	Chemical Treatment (continued)	Neutralization	Well developed technology for pH adjustment and metals precipitation. Bench scale testing would be required to select appropriate neutralization chemicals.	Readily implemented using conventional, commercially available equipment.	Moderate capital; moderate to high O&M dependent upon the type/quantity of neutralization chemicals used, and quantity and nature of potential sludge generated.	Retained.
Removal	On-site Discharge	Groundwater Recharge Wells or Basins	Effective in appropriate hydrogeologic environments; however, fouling of recharge wells/basins may be a significant problem.	Potentially implementable. Pilot testing would be required. Compliance with substantiative standards for groundwater discharge/injection would be required.	Moderate to high capital; moderate O&M depending on propensity toward fouling.	Retained. However, other process options are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.
		Surface Water	Effective and reliable.	Readily implementable. Compliance with substantiative standards for surface water discharges would be required.	Low capital; low O&M.	Retained.

TABLE 10A
Evaluation of Remedial Technology Process Options for Groundwater and Surface Water
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Removal (continued)	Off-site Discharge	POTW	Effective and reliable.	Readily implementable. Compliance with relevant and appropriate standards for discharging to POTW would be required. Preliminary discussions with POTW (MWRA) indicate no discharge of groundwater allowed to sewer system.	Low capital; moderate O&M.	Retained. However, other process options are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.
		Transport to POTW	Effective and reliable.	Implementable. Compliance with relevant and appropriate standards for discharging to POTW would be required. Preliminary discussions with POTW (MWRA) indicate no discharge of groundwater allowed to sewer system.	High capital; no O&M.	Retained. However, other process options are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.

TABLE 10B
Evaluation of Remedial Technology Process Options for Soil
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
No Action	None	None	Does not achieve remedial action objectives.	Not applicable.	Low (Five-Year Reviews)	Retained for baseline comparative purposes in accordance with NCP.
Limited Action	Use Restrictions	Deed Restrictions	Effectiveness depends on continued future implementation/enforcement. Does not reduce contamination.	Easily implemented; administratively feasible. Institutional controls include restrictions on future land use.	Low capital costs; low O&M costs.	Retained.
	Access Restrictions	Fencing and Security Measures	Moderately effective in reducing potential exposure. Does not reduce contamination.	Easily implemented.	Low capital costs; low O&M costs.	Retained.
	Long-Term Monitoring	Long-Term Monitoring	Effective in evaluating the protectiveness of the remedy.	Easily implemented	Low capital costs; moderate O&M costs	Retained
Containment	Cap/Cover	Asphalt/ Concrete	Effective in reducing potential exposure; but susceptible to weathering and cracking. Does not reduce contamination.	Easily implemented.	Moderate capital; low O&M.	Retained.
		Soil	Effective in reducing potential exposure (depending on thickness). Does not reduce contamination.	Easily implemented.	Low capital; low O&M.	Retained.
		Composite Cap	Effective in reducing potential exposure. Does not reduce contamination.	Easily implemented.	High capital; low O&M.	Retained.
In-Situ Treatment	Physical/ Chemical	Solidification/ Stabilization	Effective in reducing mobility of metals, particularly at high concentrations. Some EPA studies indicate potential application to organics. Effectiveness for asbestos-contaminated soils is not demonstrated. Does not reduce contaminant mass.	Potentially implementable. Materials and equipment are readily available. Bench testing required to determine suitable treatment agents. Debris in soils may complicate implementation	High capital costs. No O&M costs.	Eliminated. Effectiveness for asbestos soils not demonstrated. Debris in soils may complicate implementation. Capital costs are typically higher than Cap/Cover technologies.

TABLE 10B
Evaluation of Remedial Technology Process Options for Soil
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Ex-situ Treatment	Physical/ Chemical	Solidification/ Stabilization	Effective in reducing mobility of metals, particularly at high concentrations. Some EPA studies indicate potential application to organics. Effectiveness for asbestos-contaminated soils is not demonstrated. Does not reduce contaminant mass. Stabilization may be required prior to off-site disposal.	Potentially implementable. Materials and equipment are readily available. Bench testing required to determine suitable treatment agents.	High capital costs relative to other post-excavation process options (e.g., disposal). No O&M costs.	Retained.
		Soil Washing	Potentially effective method for addressing the mixture of contaminants at the Site. Effectiveness for asbestos-contaminated soils is not demonstrated. Suitability is strongly dependent upon percentage of fine particles in soils.	Potentially implementable. Bench testing would be required.	High capital costs relative to other post-excavation process options (e.g., disposal). No O&M costs.	Eliminated. The limited volume of contaminated soils that are projected to require remedial action would likely render this option cost prohibitive relative to other post-excavation process options (e.g., disposal).
		Chemical Extraction	Potentially effective in removing contaminants and reducing exposure. Effectiveness for asbestos-contaminated soils is not demonstrated.	Potentially implementable. Bench-scale testing would be required to determine suitable treatment agents.	High capital costs relative to other post-excavation process options (e.g., disposal). No O&M costs.	Eliminated. The limited volume of contaminated soils that are projected to require remedial action would likely render this option cost prohibitive relative to other post-excavation process options (e.g., disposal).
Removal	Excavation	Excavation	Effective in removing contaminants.	Easily implemented.	Moderate to high capital costs. No O&M costs.	Retained.
	Disposal	On-site Disposal	Effective in reducing potential exposure.	Implementable.	High capital costs; O&M costs vary by containment technology.	Retained. May consider combining with solidification/stabilization to treat soils prior to on-site disposal.
		Off-site Disposal	Effective in reducing potential exposure.	Implementable.	High capital costs.	Retained. May consider combining with solidification/stabilization to treat soils prior to off-site disposal.

TABLE 10C
Evaluation of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
No Action	None	None	Does not achieve remedial action objectives.	Not applicable.	Low (Five-Year Reviews).	Retained for baseline comparative purposes in accordance with NCP.
Limited Action	Use Restrictions	Deed Restrictions	Effectiveness depends on continued future implementation. Does not reduce contaminant concentrations.	Easily implemented; administratively feasible.	Low capital costs; low O&M costs.	Retained.
	Long-Term Monitoring	Long-Term Monitoring	Effective to evaluate whether remedy is protective.	Easily implemented	Low capital costs; Moderate O&M costs	Retained.
Containment	Cap/Cover	Aqueous Cap	Limited effectiveness in reducing exposure to contamination. Does not reduce contaminant concentrations.	Implementability dependent on institutional controls/administrative requirements and long-term O&M of the West Street Dam.	Moderate capital costs; moderate O&M costs.	Retained. However, other process options are more likely to be selected based on current Site knowledge.
		Engineered Sub-Aqueous Cap	Capping materials such as concrete or bentonite may be effective in limiting exposure to contamination. To limit ecological impacts after cap placement, this option would be combined with measures such as wetland or streambed reclamation.	Implementable.	High capital costs; moderate O&M costs.	Retained.
		Natural Sub-Aqueous Cap	Installation of a clean sediment cap may be effective in limiting exposure to contamination. To limit ecological impacts after cap placement, this option would be combined with measures such as wetland or streambed reclamation.	Implementable.	Moderate capital costs; moderate O&M costs.	Retained. However, other process options are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.

TABLE 10C
Evaluation of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
In-Situ Treatment	Physical/ Chemical	Solidification / Stabilization	Effectiveness for asbestos-contaminated sediments is not demonstrated. Does not reduce contaminant mass.	Potentially implementable. Materials and equipment are readily available. Bench testing required to determine suitable treatment agents.	Moderate capital costs. No O&M costs.	Eliminated. Unproven technology for asbestos-impacted sediments. The limited volume of asbestos impacted sediments at concentrations greater than 1% would make this option less cost effective than other, equally protective alternatives (e.g., Engineered Sub-Aqueous Cap.
Ex-situ Treatment	Physical/ Chemical	Solidification / Stabilization	Effectiveness for asbestos-contaminated sediments is not demonstrated. Does not reduce contaminant mass. However, may be combined with disposal technologies to reduce mobility of other analytes present in sediment.	Potentially implementable. Materials and equipment are readily available. Bench testing required to determine suitable treatment agents. May generate large volumes of waste requiring subsequent disposal.	High capital costs; no O&M costs.	Retained. May be combined with disposal technologies, if applicable.
		Soil Washing	Effectiveness for asbestos-contaminated sediments is not demonstrated. Suitability is strongly dependent upon percentage of fine particles in sediments.	Potentially implementable. Bench testing would be required. May generate large volumes of waste requiring subsequent disposal.	High capital costs; no O&M costs.	Eliminated. Effectiveness for treating asbestos contamination is unproven. Since this option would be combined with either on-Site consolidation or off-Site disposal of the treated soils, it would likely add unnecessary costs to the remedial solution.
Removal	Excavation	Dredging	Effective at removing contaminants. Potential ecological impact of removing sediments should be carefully evaluated.	Implementable; however, would need to be combined with treatment and/or disposal.	High capital costs; no O&M costs.	Retained.
		Dry Excavation	Effective at removing contaminants. Potential ecological impact of removing sediments should be carefully evaluated.	Implementable; however, would need to be combined with treatment and/or disposal.	High capital costs; no O&M costs.	Retained.

TABLE 10C
Evaluation of Remedial Technology Process Options for Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
Removal (continued)	Disposal	On-site Disposal	Effective in reducing potential exposure when combined with dredging/dry excavation.	Implementable.	Moderate capital costs; O&M costs vary by containment technology.	Retained. May consider combining with solidification/stabilization to treat sediments prior to on-site disposal.
		Off-site Disposal	Effective in reducing potential exposure when combined with dredging/dry excavation.	Implementable.	High capital costs; no O&M costs.	Retained. May consider combining with solidification/stabilization to treat sediments prior to off-site disposal.

Notes:
1. Flood plain sediments that are typically not wet (e.g., no standing water above sediment) are considered soil for remedial purposes and therefore, not considered as part of this table.

TABLE 10D
Evaluation of Remedial Technology Process Options for Soil Vapor
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
No Action	None	None	Does not achieve remedial action objectives.	Not applicable.	Low (Five-Year Reviews).	Retained for baseline comparative purposes in accordance with the NCP.
Limited Action	Use Restrictions	Deed Restrictions	Effectiveness depends on continued future implementation/enforcement. Does not reduce contamination.	Easily implemented; administratively feasible.	Low capital costs; low O&M costs.	Retained.
	Monitoring	Vapor and Indoor Air Sampling	Does not reduce contamination.	Easily implemented; administratively feasible.	Low capital costs; moderate O&M costs.	Retained.
Containment	Horizontal Barriers	Concrete Slab	Effective at reducing exposure to contaminants; does not reduce contamination.	Easily implemented. Must be used in conjunction with vapor extraction and monitoring.	Low capital costs; moderate O&M costs.	Retained.
		Geomembrane	Effective at reducing exposure to contaminants; does not reduce contaminant mass.	Easily implemented. Would likely need to be used in conjunction with vapor extraction and monitoring.	Moderate capital costs; moderate O&M costs.	Retained.
Extraction/ Removal/ Collection	Extraction	Soil Vapor Extraction	Effective at reducing exposure to contaminants and reducing contaminant concentrations when combined with vapor treatment.	Easily implemented. Must be used in conjunction with monitoring.	Low capital costs; moderate O&M costs.	Eliminated. Other extraction process options (e.g., sub-slab depressurization) likely to be as or more protective.
		Sub-Slab Depressurization	Effective at reducing exposure to contaminants.	Easily implemented. Must be used in conjunction with monitoring.	Low capital costs; moderate O&M costs.	Retained.
HVAC Modifications	Ventilation	Ventilation	Effective at reducing exposure to contaminants; does not reduce contamination.	Potentially implementable. Increased indoor air flow may increase mass flux of soil vapor indoors relative to ambient conditions. Use in conjunction with monitoring.	Low capital costs; moderate O&M costs.	Retained. However, other process options are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.

TABLE 10D
Evaluation of Remedial Technology Process Options for Soil Vapor
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

General Response Action	Potential Remedial Technology	Process Option	Effectiveness	Implementability	Relative Cost	Retain / Eliminate
HVAC Modifications (continued)	Pressurization	Pressurization	Effective at reducing exposure to contaminants; does not reduce contamination.	Easily implemented for new buildings, but may be more difficult for older buildings. Must be used in conjunction with monitoring.	Low to moderate capital costs; moderate O&M costs.	Retained. However, other process options are more likely to be selected based on current Site knowledge. Therefore, other process options will be used for costing purposes in the FS, but this process option is retained in case pre-design studies result in a recommendation to use this process option.
Building Repairs	Sealing	Sealing	Moderately effective at reducing exposure to contaminants; does not reduce contamination.	Easily implemented for new buildings, but may be more difficult for older buildings. Must be used in conjunction with monitoring	Low to moderate capital costs; moderate O&M costs.	Retained.

TABLE 11A
Remedial Alternatives for Surface Water Protection
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Groundwater and Surface Water Remedial Alternatives						
	Process Options					
Remedial Alternative	Deed Restriction	Fencing and Security	Long-Term GW/SW Monitoring	Collection Trench / Extraction Wells	Ex-situ treatment	Surface Water Discharge
SW-1: No Action						
SW-2: Limited Action	X	X	X			
SW-3: Groundwater collection with ex-situ treatment of groundwater.	X		X	X	X	X

TABLE 11B
Remedial Alternatives for Soil East of South Street
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Soil Remedial Alternatives East of South Street										
		Process Options								
Redevelopment Scenario	Remedial Alternative	Deed Restricion	Fencing and Security	Vapor Sampling/Monitoring	Maintain Existing Cap / Cover	New Cap / Cover	Horizontal Barrieer	Sub-Slab Depressurization	Excavation	Off-Site Disposal
Site Worker	SO-1: No Action									
Site Worker	SO-2: Limited Action	X	X	X	X					
Site Worker	SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos	X		X	X		X	X		
Site Worker	SO-4: Limited Excavation	X							X	X
Daycare Child Exposure	SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils	X				X			X	X
Daycare Child Exposure	SO-6: Comprehensive Excavation and Off-Site Disposal	X							X	X

TABLE 11C
Remedial Alternatives for the Area of Containment and Settling Basin #2 Containment Cell
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Remedial Alternatives for the Area of Containment and Settling Basin #2 Containment Cell					
Remedial Alternative	**Process Options**				
	Deed Restriction	**Fencing and Security Measures**	**Maintain Exisiting Cap / Cover**	**Excavation**	**Off-Site Disposal**
AOC-1: No Action					
AOC-2: Limited Action	X	X	X		
AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls	X	X	X	X	X
AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-site Disposal, Institutional Controls	X	X		X	X

TABLE 11D
Remedial Alternatives for the Former Mill Tailrace, Neponset River Floodplain, & Lewis Pond
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Soil and Sediment Remedial Alternatives for the Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond							
Remedial Alternative	**Process Options**						
	Deed Restriction	**Fencing and Security Measures**	**Aqueous Cap**	**Engineered Isolation Cap**	**Excavation**	**Dredging**	**Off-Site Disposal**
SSW-1: No Action							
SSW-2: Limited Action	X	X					
SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment	X		X		X		X
SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment	X			X	X		X
SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond					X	X	X

TABLE 12A-1
ARAR Summary for Alternative SW-1
Mass Reduction and Surface Water Protection: No Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clean Water Act (33 U.S.C.. § 1251 *et seq.*); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R.. § 122.44)	Relevant and Appropriate	NRWQC establish water quality standards for the protection of human health and aquatic life.	This alternative will not meet these standards, since exceedances of these water quality standards in the tailrace, leading to the Neponset River, will not be addressed.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. Part 141, Subpart B and G)	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources outside the Site.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. 141, Subpart F)	Relevant and Appropriate for non-zero MCLGs; MCLGs set at zero are To Be Considered.	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources outside the Site.
State Requirements	Massachusetts Surface Water Quality Standards (314 CMR 4.00)	Relevant and Appropriate	Designates minimum water quality criteria for sustaining state designated uses for surface waters in the Commonwealth. Allows for site-specific criteria where federal water quality criteria are invalid due to site-specific characteristics.	This alternative will not meet these standards, since exceedances of these water quality standards in the tailrace, leading to the Neponset River, will not be addressed.
State Requirements	Massachusetts Drinking Water Standards (310 CMR 22.00)	Relevant and Appropriate	These standards establish State MCLs for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water systems. They are to be used where they are more stringent than Federal MCLs.	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources outside the Site.

TABLE 12A-1
ARAR Summary for Alternative SW-1
Mass Reduction and Surface Water Protection: No Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
State Requirements	Massachusetts Contingency Plan (MCP) Method 1 GW-1 Standards (310 CMR 40.0974)	Relevant and Appropriate	These are promulgated standards for characterizing the risk posed by COCs in groundwater under the MCP. The MCP Method 1 GW-1 standards will only apply for compounds where the standard is more restrictive than the federal MCL or MCLG, or for which no MCL or MCLG currently exists.	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources
State Requirements	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Relevant and Appropriate	Establishes groundwater quality criteria necessary to sustain the designated uses, and regulations necessary to achieve the designated uses or maintain the existing groundwater quality.	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources outside the Site.
State Requirements	Massachusetts Hazardous Waste Rules - Groundwater Protection (310 CMR 30.660)	Relevant and Appropriate	Facility standards for the protection of groundwater. Groundwater standards must be met beyond a point of compliance (310 CMR 30.669)	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources outside the Site.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants in groundwater will not be addressed.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants in groundwater will not be addressed.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants in groundwater will not be addressed.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants in groundwater will not be addressed.

TABLE 12A-1
ARAR Summary for Alternative SW-1
Mass Reduction and Surface Water Protection: No Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
Federal Requirements	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 300 ppm.	This alternative will not meet these standards since no compliance zone for the area of contaminated media will be established and no monitoring will be performed to evaluate whether the remedy is protective of groundwater resources outside the Site.
LOCATION-SPECIFIC				
	None			
ACTION-SPECIFIC				
	None			

TABLE 12A-2
ARAR Summary for Alternative SW-2
Mass Reduction and Surface Water Protection: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R.. § 122.44)	Relevant and Appropriate	NRWQC establish water quality standards for the protection of human health and aquatic life.	This alternative will not meet these standards to address risks to the environment, since exceedances of these water quality standards in the former mill tailrace, leading to the Neponset River, will not be addressed by institutional controls only.
State Requirements	Massachusetts Surface Water Quality Standards (314 CMR 4.00)	Relevant and Appropriate	Designates minimum water quality criteria for sustaining state designated uses for surface waters in the Commonwealth. Allows for site-specific criteria where federal water quality criteria are invalid due to site-specific characteristics.	This alternative will not meet these standards to address risks to the environment, since exceedances of these water quality standards in the former mill tailrace, leading to the Neponset River, will not be addressed by institutional controls only.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard since institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since institutional controls will prevent potential non-carcinogenic hazards caused by exposure to contaminants in groundwater.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will meet this standard since institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.

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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
Federal Requirements	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 300 ppm.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C.. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practical alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes monitoring work to be performed in or near a wetland. If there are no practical alternatives to locating monitoring activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C.. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. §6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes monitoring work to be performed in or near wetland and floodplain areas. EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to locating monitoring activities in the 100-year floodplain, then measures will be taken to limit impacts.

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Mass Reduction and Surface Water Protection: Limited Action
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there are no practical alternatives to locating monitoring activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C.. §469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by this standard (such as the former mill tailrace), activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C.. §470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by this standard (such as the mill tailrace), activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include streambanks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there are no practical alternatives to locating monitoring activities in wetlands or their buffer zones, then measures will be taken to limit impacts.

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ARAR Summary for Alternative SW-2
Mass Reduction and Surface Water Protection: Limited Action
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating monitoring activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12A-2
ARAR Summary for Alternative SW-2
Mass Reduction and Surface Water Protection: Limited Action
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq*), Subtitle C - Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place. Applicable for hazardous waste generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Hazardous waste includes an aqueous waste with a pH greater than or equal to 12.5. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of monitoring activities will be characterized as hazardous or non-hazardous. If determined to be hazardous waste, then it will be stored, transported, and disposed off-Site in accordance with these standards. However, this alternative will not meet the closure/post closure standards because institutional controls alone will not address migration of contaminants to groundwater and surface water that results in exceedances of surface water quality criteria in the former mill tailrace.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. Part 141, Subpart B and G)	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq.*); National primary drinking water regulations (40 C.F.R. 141, Subpart F)	Relevant and Appropriate for non-zero MCLGs; MCLGs set at zero are To Be Considered.	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

TABLE 12A-2
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Mass Reduction and Surface Water Protection: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Relevant and Appropriate for hazardous wastes left in place; Applicable for hazardous wastes generated pursuant to this alternative	This standard establishes requirements for determining whether wastes are hazardous. 310 CMR 30.123 specifically addresses identification of characteristic hazardous waste based on corrosivity.	Wastes generated as part of monitoring activities will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and the accumulation of waste prior to offsite disposal	Hazardous wastes generated as a part of the remedial action, including during monitoring, will be handled in compliance with the requirements of these regulations
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations contain standards for closure, post closure, and groundwater monitoring.	This alternative will not meet these standards, since monitoring and institutional controls alone will not adequately address migration of contaminants to groundwater and surface water that result in exceedances of surface water quality criteria in the former mill tailrace.
State Requirements	Massachusetts Hazardous Waste Rules - Groundwater Protection (310 CMR 30.660)	Relevant and Appropriate	Facility standards for the protection of groundwater. Groundwater standards must be met beyond a point of compliance (310 CMR 30.669)	Monitoring will evaluate whether groundwater protection standards are maintained at the point of compliance for the SO and AOC waste management areas.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
State Requirements	Massachusetts Drinking Water Standards (310 CMR 22.00)	Relevant and Appropriate	These standards establish State MCLs for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water systems. They are to be used where they are more stringent than Federal MCLs.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Contingency Plan (MCP) Method 1 GW-1 Standards (310 CMR 40.0974)	Relevant and Appropriate	These are promulgated standards for characterizing the risk posed by COCs in groundwater under the MCP. The MCP Method 1 GW-1 standards will only apply for compounds where the standard is more restrictive than the federal MCL or MCLG, or for which no MCL or MCLG currently exists.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Relevant and Appropriate	Establishes groundwater quality criteria necessary to sustain the designated uses, and regulations necessary to achieve the designated uses or maintain the existing groundwater quality.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq*.); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R. § 122.44)	Relevant and Appropriate	NRWQC establish water quality standards for the protection of human health and aquatic life.	This alternative will meet these standards through collection and treatment of contaminated groundwater that might otherwise contribute to exceedances of these water quality standards in the tailrace, leading to the Neponset River.
State Requirements	Massachusetts Surface Water Quality Standards (314 CMR 4.00)	Relevant and Appropriate	Designates minimum water quality criteria for sustaining state designated uses for surface waters in the Commonwealth. Allows for site-specific criteria where federal water quality criteria are invalid due to site-specific characteristics.	This alternative will meet these standards through collection and treatment of contaminated groundwater that might otherwise contribute to exceedances of these water quality standards in the tailrace, leading to the Neponset River.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential non-carcinogenic hazards caused by exposure to contaminants in groundwater.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.

TABLE 12A-3
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Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will meet these standards through collection and treatment of contaminated groundwater which will prevent potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Health Advisories (EPA Office of Drinking Water)	To Be Considered	Health Advisories are estimates of risk due to consumption of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 300 ppm.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

TABLE 12A-3
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Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes work to be performed in or near a wetland. Construction of any collection trench or other remedial activities that will alter wetlands will be conducted in accordance with these standards. This is the least damaging practicable alternative for protecting wetland resources from site contamination.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes work to be performed in or near wetland and floodplain areas. EPA will consult with U.S. Fish and Wildlife Service should Remedial Activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practicable alternative to siting the collection trench and other remedial activities within the 100-year floodplain, all practicable means will be taken to limit harm to and preserve beneficial values of floodplains.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there is no practicable alternative to siting the collection trench and other remedial activities within wetlands or if removal of groundwater will negatively alter downgradient wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq*.), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release during a 100-year flood.	In the event that the system treats hazardous waste, remedial structures, including the collection trench, within the 100-year floodplain, will be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq*.); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards (such as the mill tailrace), activities will be coordinated with the Department of the Interior.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq*.); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards (such as the mill tailrace), activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include streambanks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to siting the collection trench and other remedial activities within wetland resource areas or their buffer zones, or if removal of groundwater will negatively alter downgradient wetland resources, then measures will be taken to limit impacts.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.

TABLE 12A-3
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	In the event that the system treats hazardous waste, remedial structures, including the collection trench, within Land Subject to Flooding and potential public water supply area, will be designed, constructed, operated and maintained to prevent a release of hazardous waste within the protected resource area.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§ 26-27); Massachusetts Historical Commission (950 CMR § 70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR § 71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards (such as the mill tailrace), whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remediation wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if treated water from the remedial action is discharged to surface waters, including the tailrace and adjacent wetlands.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if treated water from the remedial action is discharged to a POTW.

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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq*.), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Hazardous waste includes an aqueous waste with a pH greater than or equal to 12.5. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of collection, treatment, or monitoring activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. The Alternative will meet the closure/post closure standards because collection, treatment and discharge of contaminated groundwater will prevent migration of contamination to groundwater and surface water that results in exceedances of surface water quality criteria in the Former Mill Tailrace.

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Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	RCRA Interim Status: Chemical, Physical, or Biological Treatment (40 C.F.R. Part 265, Subpart Q)	Relevant and Appropriate	Standards for using chemical, physical, or biological treatment at hazardous waste facilities.	If a component of an ex-situ treatment system utilizes chemical, physical, or biological treatment to treat hazardous waste, then these standards will be met.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards are set for air strippers, dust control and other release sources.	If a component of the ex-situ treatment system generates regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	RCRA, Air Emissions from Process Vents, 40 C.F.R. Part 264, Subpart AA	Relevant and Appropriate	Establishes air emission controls for process vents, closed-vent systems, and control devices at hazardous waste facilities; and applies to distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping operations that "manage hazardous wastes with organic concentrations of a least 10 ppmv." Massachusetts has not yet adopted these regulations so these federal regulations are the applicable standard.	If a component of an ex-situ treatment system treats hazardous waste and utilizes a process regulated by this section, air emission controls will be implemented if the applicability threshold is met.

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Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	RCRA, Air Emissions for Tanks, Surface Impoundments and Containers, 40 C.F.R. Part 265, Subpart CC	Relevant and Appropriate	Establishes air emission controls for tanks, surface impoundments or containers at hazardous waste facilities involving hazardous waste which meets the applicability threshold. Massachusetts has not yet adopted these regulations so these federal regulations are the applicable standard.	If ex-situ treatment system treats hazardous waste and utilizes tanks or other structures regulated under these regulations, then they will be operated in compliance with these standards.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq*.); National primary drinking water regulations (40 C.F.R. Part 141, Subpart B and G)	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate cleanup standards for aquifers and surface water bodies that are potential drinking water sources	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
Federal Requirements	Safe Drinking Water Act (42 U.S.C. §300f *et seq*.); National primary drinking water regulations (40 C.F.R. 141, Subpart F)	Relevant and Appropriate for non-zero MCLGs; MCLGs set at zero are To Be Considered	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters from the ex-situ treatment facilities will be designed and operated so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	Massachusetts Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges (314 CMR 12.03(8); 12.04(2),(3),(5),(8-12), 12.05(1),(6),(12), 12.06(1-3)	Relevant and Appropriate	Establishes operation and maintenance standards for treatment works.	The ex-situ treatment system, although not "treatment works", will not allow waste to bypass system, will have an alarm system in place, and will be maintained properly and safely with adequate tools, equipment, parts, personnel, etc. Sampling and analysis will be conducted according to the site plan.

TABLE 12A-3
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Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Materials in Waters of the US within the Commonwealth (314 CMR 9.00)	Applicable	Establishes criteria and standards for protecting water quality from dredging, handling and disposal of fill material and dredged material in state regulated wetland resource areas and their buffer zones.	Activities will be conducted in accordance with these requirements to protect State wetland resources
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This regulation establishes requirements for determining whether wastes are hazardous. 310 CMR 30.123 specifically addresses identification of characteristic hazardous waste based on corrosivity.	Waste generated as part of the remedial action will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal.	Hazardous wastes generated as a part of a remedial action will be handled in compliance with the requirements of these regulations

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Applicable	General facility requirements for waste analysis, security measures, inspections, personnel training, and closure/post-closure.	If the ex-situ treatment system treats hazardous waste, it will be constructed and operated in accordance with this requirement. All workers will be properly trained. Closure/post-closure standards will be met since collection, treatment and discharge of groundwater will address the migration of contaminants to groundwater and surface water that results in exceedances of surface water quality criteria in the Former Mill Tailrace.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Applicable	Standards for wastewater treatment units for the treatment of hazardous waste.	If the ex-situ treatment system treats groundwater with hazardous characteristics prior to discharge to surface waters or a POTW, the standards of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for the ex-situ treatment system or for monitoring-generated waste will comply with these requirements.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	This ARAR specifies requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for on-site treatment or storage of hazardous wastes in tanks. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Hazardous Waste Rules - Groundwater protection (310 CMR 660)	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater. Groundwater standards must be met beyond a point of compliance (310 CMR 669)	A "contaminated media area compliance zone" for groundwater will be established for the Site. Groundwater outside of this area is expected to meet USEPA MCLs.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	The ex-situ treatment system will meet these regulations through a monitoring program and engineering controls if necessary.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Ex-situ treatment will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial treatment will cause ambient air quality standards to be exceeded. Dust standards will be complied with during any and all excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Construction activities and the operation of the ex-situ treatment system will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), and noise (310 CMR 7.10).
State Requirements	Massachusetts Contingency Plan, Rules for Remedial Air Emissions (310 CMR 40.0049	Relevant and Appropriate	The rules set forth standards for emissions from remedial activities, including a general requirement for 95% control over emissions from the remedial system	This alternative will be designed and operated so that remedial air emissions will meet these requirements.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Drinking Water Standards (310 CMR 22.00)	Relevant and Appropriate	These standards establish State MCLs for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water systems. They are to be used where they are more stringent than Federal MCLs.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Contingency Plan (MCP) Method 1 GW-1 Standards (310 CMR 40.0974)	Relevant and Appropriate	These are promulgated standards for characterizing the risk posed by COCs in groundwater under the MCP. The MCP Method 1 GW-1 standards will only apply for compounds where the standard is more restrictive than the federal MCL or MCLG, or for which no MCL or MCLG currently exists.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Relevant and Appropriate	Establishes groundwater quality criteria necessary to sustain the designated uses, and regulations necessary to achieve the designated uses or maintain the existing groundwater quality.	Groundwater outside the compliance zone for the SO and AOC waste management areas currently meets these standards. Monitoring will be performed to evaluate that the remedy continues to be protective of groundwater resources outside the compliance zone.
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	Relevant standards of these regulations will be followed to the extent that the alternative involves decommissioning of monitoring wells.

TABLE 12A-3
ARAR Summary for Alternative SW-3
Mass Reduction and Surface Water Protection: Groundwater Collection with Ex-Situ Treatment of Groundwater
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Threshold Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for Ambient Air	To Be Considered	DEP has issued guidance setting out permissible concentrations of air toxics in ambient air. The TELs and AALs are used to guide permitting decisions for sources of air toxics.	This alternative will be designed and operated so that remedial air emissions from ex-situ treatment do not cause any exceedances of TELs or AALs.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12B-1
ARAR Summary for Alternative SO-1
Soil Remedial Alternatives East of South Street: No Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard since risks from asbestos would not be addressed.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will not be addressed.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
LOCATION-SPECIFIC				
	None			
ACTION-SPECIFIC				
	None			

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard since institutional controls and maintaining the current cover will not prevent potential exposure to asbestos for currently allowed uses of the Site.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since institutional controls and maintaining the current cover will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the Site.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will not meet this standard since institutional controls and maintaining the current cover will not prevent potential non-carcinogenic hazards caused by exposure to contaminants for currently allowed uses of the Site.

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since institutional controls and maintaining the current cover will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the Site.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will not meet this standard since institutional controls and maintaining the current cover will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the Site.

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes work to be performed in or near a wetland. If there are no practical alternatives to locating monitoring and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. §6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes work to be performed in or near wetland and floodplain areas. There will be consultation with the U.S. Fish and Wildlife Service should Remedial Activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to locating monitoring and other activities in the 100-year floodplain, then measures will be taken to limit impacts.

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there are no practical alternatives to locating monitoring and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. §469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by this ARAR, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. §470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by this ARAR, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there are no practical alternatives to locating monitoring and other activities in wetland resource areas or their buffer zones, then measures will be taken to limit impacts.

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 CMR. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating monitoring and other activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These relevant and appropriate standards will be complied with for any asbestos-containing materials managed or handled as part of monitoring or other activities at the Site. Institutional controls, including establishment of a soil management plan, and maintaining the current cover may not be sufficient to be protective for redevelopment of the property for educational purposes.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes monitoring and other activities in areas containing asbestos. These standards will be complied with for any asbestos-containing materials handled as part of monitoring or other activities at the Site. Institutional controls, including establishing a soil management plan, and maintaining the current cover may not be sufficient to be protective of human health and the environment.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 et seq.), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of this alternative and wastes to be left in place will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste generated from monitoring will be stored, transported, and disposed off-Site in accordance with these standards. The existing cover and proposed institutional controls are not sufficient to address any hazardous waste that would be left on site..

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable for wastes generated pursuant to this alternative	These standards establish requirements for determining whether wastes are hazardous.	Wastes generated from monitoring as part of this alternative and wastes left in place will be characterized as hazardous or non-hazardous.

TABLE 12B-2
ARAR Summary for Alternative SO-2
Soil Remedial Alternatives East of South Street: Limited Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules, Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and the accumulation of waste prior to offsite disposal, as well as to waste left in place.	Hazardous wastes generated as part of monitoring and other activities will be handled in compliance with the requirements of these regulations. If hazardous waste is present, the existing cover and proposed institutional controls are not sufficient to address any remaining on-site contamination.
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations establish standards for closure, post closure, and groundwater monitoring.	This Alternative will not meet these standards if hazardous waste is present, since maintaining the existing cover and proposed institutional controls will not adequately address any hazardous waste left in place at the site
Federal Requirements	OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004 (November 2002)	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard since institutional controls and maintaining the existing cover will prevent potential exposure to asbestos for currently allowed uses of the Site.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since institutional controls, vapor mitigation measures, and maintaining the existing cover will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the Site.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will not meet this standard since institutional controls, vapor mitigation measures, and maintaining the existing cover will not prevent potential non-carcinogenic hazards caused by exposure to contaminants for currently allowed uses of the Site.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since institutional controls, vapor mitigation measures, and maintaining the existing cover will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the Site.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will not meet this standard since institutional controls, vapor mitigation measures, and maintaining the existing cover will not prevent potential carcinogenic risks caused by exposure to contaminants.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes work to be performed in or near a wetland. If there are no practical alternatives to locating monitoring and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes work to be performed in or near wetland and floodplain areas. There will be consultation with the U.S. Fish and Wildlife Service should Remedial Activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to conducting remedial activities in the 100-year floodplain, then measures will be taken to limit impacts.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to conducting monitoring and other remedial activities within wetland resource areas or their buffer zones, then measures will be taken to limit impacts.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These relevant and appropriate standards will be complied with for any asbestos-containing materials handled as part of monitoring or other activities at the Site. Institutional controls, including a soil management plan, and maintaining the current cover may not be sufficient to be protective for redevelopment of the property for educational purposes.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes monitoring and other activities in areas containing asbestos. These standards will be complied with for any asbestos-containing materials handled as part of monitoring or other activities at the Site. Institutional controls, including a soil management plan, and maintaining the current cover may not be sufficient to be protective of human health and the environment.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of vapor mitigation and other remedial activities, as well as contamination left on site, will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. The existing cover, proposed vapor mitigation measures, and proposed institutional controls are not sufficient to address on-Site hazardous waste contamination.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	Vapor mitigation and other remedial activities that generate regulated air pollutants will meet these standards.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	These standards establish requirements for determining whether wastes are hazardous.	Waste generated as part of vapor mitigation and other remedial activities, as well as contamination left on site, will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. The existing cover, proposed vapor mitigation measures, and proposed institutional controls are not sufficient to address on-Site hazardous waste contamination.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and the accumulation of waste prior to offsite disposal, as well as to waste left in place.	Hazardous wastes generated as part of monitoring, vapor mitigation, and other remedial activities will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations contain standards for closure, post closure, and groundwater monitoring.	Waste generated as part of vapor mitigation and other remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. If hazardous waste is present, the existing cover, proposed vapor mitigation measures, and proposed institutional controls are not sufficient to address on-Site hazardous waste contamination.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for holding waste will comply with these requirements

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Contingency Plan, Rules for Remedial Air Emissions (310 CMR 40.0049)	Relevant and Appropriate	The rules set forth standards for emissions from remedial activities, including a general requirement for 95% control over emissions from the remedial system.	Vapor mitigation will be designed and operated in compliance with these requirements.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Vapor mitigation will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial treatment will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Construction activities and the operation of the vapor mitigation system will meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning vapor mitigation or monitoring wells.

TABLE 12B-3
ARAR Summary for Alternative SO-3
Soil Remedial Alternatives East of South Street: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004 (November 2002)	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.
State Requirements	Massachusetts Threshold Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for Ambient Air	To Be Considered	State guidance setting out permissible concentrations of air toxics in ambient air. The TELs and AALs are used to guide permitting decisions for sources of air toxics.	This alternative will be designed and operated so that air emissions from vapor mitigation measures do not cause exceedances of TELs or AALs.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard if all asbestos exceeding risk levels for the currently allowed uses is excavated and disposed of off-site.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since a combination of limited excavation and off-site disposal, and institutional controls will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the site.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will not meet this standard since a combination of limited excavation and off-site disposal, and institutional controls will not prevent potential non-carcinogenic risks caused by exposure to contaminants for currently allowed uses of the site.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since a combination of limited excavation and off-site disposal, and institutional controls will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the site.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will not meet this standard since a combination of limited excavation and off-site disposal, and institutional controls will not prevent potential carcinogenic risks caused by exposure to contaminants for currently allowed uses of the site.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes work to be performed in or near a wetland. If there are no practical alternatives to locating monitoring and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes work to be performed in or near wetland and floodplain areas. There will be consultation with the U.S. Fish and Wildlife Service should Remedial Activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to conducting remedial activities in the 100-year floodplain, then measures will be taken to limit impacts.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to conducting remedial activities within wetland resource areas or their buffer zones, then measures will be taken to limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to a POTW.
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These relevant and appropriate standards will be complied with for any asbestos-containing materials handled as part of excavation, monitoring or other activities at the Site. Institutional controls, including a soil management plan, and removing asbestos concentrations above PRGs will be sufficient to be protective for redevelopment of the property for educational purposes.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	These standards will be complied with for any asbestos-containing materials excavated/handled of as part of this remedial alternative.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Confirmatory testing within the excavation will evaluate whether all hazardous waste contaminated media have been removed. Relevant and appropriate requirements of these standards will not be met if hazardous waste is left in place.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If excavation or other remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	These standards establish requirements for determining whether wastes are hazardous.	Wastes generated as part of excavation and other remedial activities and contaminated soils left in place will be characterized as hazardous or non-hazardous. Confirmatory testing within in the excavation will evaluate whether all hazardous waste contaminated media have been removed.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If it is necessary to treat water from excavation of contaminated media prior to discharge to surface waters or a POTW, then the requirements of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that hold field-generated hazardous wastes.	Any hazardous waste containers used for holding waste will comply with these requirements.
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	This regulation specifies requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for on-site treatment or storage of hazardous waste in tanks. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation	Any excavation water treatment facilities will meet these regulations through a monitoring program and engineering controls if necessary

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations establish standards for closure, post closure, and groundwater monitoring.	Waste generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Confirmatory testing within the excavation will evaluate whether contaminated media have been removed. Relevant and appropriate requirements of these standards may not be met if hazardous waste remains on site without sufficient measures taken to prevent exposure for currently allowed uses of the Site. .
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Excavation and other remedial measures will be implemented in accordance with these rules. No air emissions will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Excavation and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).

TABLE 12B-4
ARAR Summary for Alternative SO-4
Soil Remedial Alternatives East of South Street: Limited Excavation
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning monitoring wells.
Federal Requirements	OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004 (November 2002)	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard, since all asbestos areas will be addressed through excavation, off-site disposal., and a soil management plan for all unexcavated areas.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard since a combination of excavation and off-site disposal, a new cover, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants, as long a the 1-foot cover can be constructed and maintained so that remaining contamination does not pose a risk for currently allowed uses of the Site.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since a combination of excavation and off-site disposal, a new cover, and institutional controls will prevent potential non-carcinogenic hazards caused by exposure to contaminants, as long a the 1-foot cover can be constructed and maintained so that remaining contamination does not pose a risk for currently allowed uses of the Site.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since a combination of excavation and off-site disposal, a new cover, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants, as long a the 1-foot cover can be constructed and maintained so that remaining contamination does not pose a risk for currently allowed uses of the Site.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since a combination of excavation and off-site disposal, a new cover, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants, as long a the 1-foot cover can be constructed and maintained so that remaining contamination does not pose a risk for currently allowed uses of the Site.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Any remedial activities that will alter wetlands will be conducted in accordance with these standards.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	There will be consultation with the U.S. Fish and Wildlife Service, as this alternative includes work to be performed in or near a wetland. Any remedial activities that will alter wetlands will be conducted in accordance with these standards.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to conducting remedial activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b))	Relevant and Applicable	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	Remedial structures (the cover) within the 100-year floodplain will be designed, constructed, operated and maintained to prevent a release of contaminated media, or hazardous constituents of contaminated media, during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to constructing and maintaining the cover, conducting monitoring and other remedial activities within wetland resource areas or their buffer zones, then measures will be taken to limit impacts.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to a POTW.
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials excavated/handled of as part of this remedial alternative. Excavation and off-site disposal of all asbestos-contaminated soil will meet standards for preventing risk from educational use of the site.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	This ARAR provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing materials excavated and handled as part of this remedial alternative. Excavation and off-site disposal of all soil with asbestos exceeding risk levels will meet these standards, with a soil management plan to address remaining contaminated soils on site..

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Confirmatory testing within the excavations will assess whether all hazardous waste contaminated media have been removed. Relevant and appropriate requirements of these standards will apply to contaminated media remaining in place. This alternative will meet these standards if the 1-foot cover to be established after excavation meets protectiveness standards for the currently allowed uses of the Site.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If excavation or other remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable for waste generated pursuant to this alternative	These standards establish requirements for determining whether wastes are hazardous.	Wastes generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. Confirmatory testing within the excavation will assess whether all contaminated media have been removed.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable for waste generated pursuant to this alternative	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If it is necessary to treat water from excavations contaminated with hazardous wastes prior to discharge to surface waters or a POTW, then the requirements of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that hold field-generated hazardous wastes.	Any hazardous waste containers used for holding waste will comply with these requirements.
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	This regulation specifies requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for on-site treatment or storage of hazardous waste in tanks. Specifications will include secondary containment, if necessary.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation	Any excavation water treatment facilities will meet these regulations through a monitoring program and engineering controls if necessary
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations establish standards for closure, post closure, and groundwater monitoring.	Excavation and off-site disposal of contaminated media, backfilling with cover material, monitoring, and institutional controls will meet relevant and appropriate standards for closure/post-closure and monitoring, as long as the 1-foot cover can be designed to prevent exposure to any hazardous waste left under the cover for currently allowed uses of the property..
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Excavation and other remedial measures will be implemented in accordance with these rules. No air emissions will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Excavation and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning monitoring wells.

TABLE 12B-5
ARAR Summary for Alternative SO-5
Soil Remedial Alternatives E. of S. St: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	EPA Alternative Cap Guidance	To Be Considered	Provides standards for alternative cap design to address potential risks to human health, ecological receptors, and surface water and groundwater from wastes left in place.	These standards will be met because the excavation of contaminated media and then capping/cover of the deeper contaminated media will prevent risks to human health and the environment due to direct contact with contaminated media. Migration of contaminants from area vadose zone soils to groundwater and surface water is not thought to be a significant issue, and hence the cap/cover is not intended to be impermeable to infiltrating precipitation.
Federal Requirements	OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004 (November 2002)	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard, since all asbestos areas will be addressed through excavation, off-site disposal, and a soil management plan for all unexcavated areas.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential non-carcinogenic hazards caused by exposure to contaminants,
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since a combination of excavation and off-site disposal, and institutional controls will prevent potential carcinogenic risks caused by exposure to contaminants.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Any remedial activities that will alter wetlands will be conducted in accordance with these standards.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	There will be consultation with the U.S. Fish and Wildlife Service, as this alternative includes work to be performed in or near a wetland. Any remedial activities that will alter wetlands will be conducted in accordance with these standards.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to conducting remedial activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b))	Relevant and Applicable	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	While hazardous waste is not anticipated to remain following excavation, the remedial action will be performed in a manner as to prevent a release of hazardous waste in the 100-year floodplain.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historical properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to performing remedial activities within wetland resource areas or their buffer zones, then measures will be taken to limit impacts.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property, must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations, is discharged to a POTW.
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials excavated/handled of as part of this remedial alternative. Excavation and off-site disposal of all asbestos-contaminated soil will meet standards for preventing risk from educational use of the site.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	This ARAR provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing materials excavated and handled as part of this remedial alternative. Excavation and off-site disposal of all soil with asbestos exceeding PRGs will meet these standards.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Waste generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Confirmatory testing within the excavations will assess whether all hazardous waste contaminated media have been removed. Relevant and appropriate requirements of these standards will apply to contaminated media remaining in place under existing structures.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If excavation or other remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable for waste generated pursuant to this alternative	These standards establish requirements for determining whether wastes are hazardous.	Wastes generated as part of excavation and other remedial activities will be characterized as hazardous or non-hazardous. Confirmatory testing within the excavation will assess whether all contaminated media have been removed.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable for waste generated pursuant to this alternative	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If it is necessary to treat water from excavations contaminated with hazardous wastes prior to discharge to surface waters or a POTW, then the requirements of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that hold field-generated hazardous wastes.	Any hazardous waste containers used for holding waste will comply with these requirements.
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	This regulation specifies requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed for on-site treatment or storage of hazardous waste in tanks. Specifications will include secondary containment, if necessary.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation	Any excavation water treatment facilities will meet these regulations through a monitoring program and engineering controls if necessary
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations establish standards for closure, post closure, and groundwater monitoring.	Excavation and off-site disposal of contaminated media, backfilling, monitoring, and institutional controls will meet relevant and appropriate standards for closure/post-closure and monitoring.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Excavation and other remedial measures will be implemented in accordance with these rules. No air emissions will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Excavation and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning monitoring wells.

TABLE 12B-6
ARAR Summary for Alternative SO-6
Soil Remedial Alternatives East of South St: Comprehensive Excavation and Off-Site Disposal
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	EPA Alternative Cap Guidance	To Be Considered	Provides standards for alternative cap design to address potential risks to human health, ecological receptors, and surface water and groundwater from wastes left in place.	If hazardous waste is left in place below existing structures,, these standards will be met because the pathway of direct contact to human receptors is eliminated.
Federal Requirements	OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004 (November 2002)	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12C-1
ARAR Summary for Alternative AOC-1
AOC and Settling Basin #2 Containment Cell: No Action
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard since asbestos risks would not be addressed.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be permanently addressed.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will not be permanently addressed.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be permanently addressed.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be permanently addressed.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will not meet this standard because existing AOC cover over lead contaminated soil would not be: maintained, subject to institutional controls, or monitored.
LOCATION-SPECIFIC				
	None			
ACTION-SPECIFIC				
	None			

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard since potential risks from asbestos will be controlled by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance on assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard since potential lead hazards will be addressed by institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes maintenance of the existing cover and Neponset River culvert to be performed in or near a wetland. If there are no practical alternatives to locating long-term monitoring, fencing, maintenance and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent mitigate or compensate for losses of fish and wildlife.	This alternative includes long-term monitoring, fencing, and maintenance of the existing cover and Neponset River culvert to be performed in or near fish and wildlife habitat. There will be consultation with the U.S. Fish and Wildlife Service should remedial activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to locating fencing, monitoring, maintenance of the existing cover and Neponset River culvert and other activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there are no practical alternatives to locating fencing, monitoring, maintenance of the cover and Neponset River culvert, and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 et seq.), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	Remedial structures within the 100-year floodplain, including the cover and Neponset River culvert will be monitored and maintained to prevent the release of contaminated media during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 et seq.); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic mill tail race, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	Remedial structures, including the cover and Neponset River culvert, within the 100-year floodplain will be monitored and maintained to prevent the release of contaminated media within the protected resource area.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practical alternative to locating fencing, monitoring, maintenance of the cover and Neponset River culvert and other activities within wetland resources and their buffer zones, then measures will be taken to limit impacts.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities, including monitoring, fencing, and maintenance of the cover and Neponset River culvert in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects, and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C.. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations during long-term maintenance of the cover or Neponset River culvert, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations during long-term maintenance of the Neponset River culvert or cover, is discharged to a POTW.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials handled/covered at the site. Furthermore, institutional controls, fencing and security measures, along with maintenance and monitoring of the cover and the Neponset River culvert will meet these standards in order to prevent exposure to children.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing >= 1% materials handled/disposed of at the Site. Furthermore, institutional controls, long-term monitoring, fencing and security measures, along with maintenance and monitoring of the cover and Neponset River culvert, will meet these standards.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized and disposed of off-site in accordance with these standards. Maintenance of the existing cover will meet relevant and appropriate closure/post-closure standards.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water from long-term maintenance, or other remedial activity, will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as part of remedial action, including long-term maintenance of the cover and Neponset River culvert and monitoring, will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Relevant and Appropriate	General facility requirements for waste analysis, security measures, inspections, and training requirements	Any remedial action completed on contaminated media, including monitoring and long-term maintenance of the cover or Neponset River culvert, will be conducted in accordance with this requirement. All workers will be properly trained. Any hazardous wastes generated will be stabilized and disposed of off-site.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules, Landfill Regulations (310 CMR 30.620)	Relevant and Appropriate	Standards for closure and post-closure of hazardous waste landfills. Since the wastes on Site have been covered in place, certain design and operating requirements listed in 310 CMR 30.622, are not relevant and appropriate to the remedy: a) 310 CMR 30.622(1) & (2) - requirement for a bottom liner; b) 310 CMR 30.622(3) - leak detection, collection, and removal system; and c) 310 CMR 30.622(4) - standards for an upper liner.	All non-asbestos wastes have been covered under the relevant and appropriate standards established under these regulations for: a protective cover, run-on and run-off control, monitoring, and closure and post-closure standards (except for liner and leak detection closure/post-closure standards that are not relevant and appropriate). Long-term monitoring and institutional controls will ensure that the remedy remains protective.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers generated as part of this alternative will comply with these requirements.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Excavation water treatment facilities used in conjunction with long-term maintenance of the cover or Neponset River culvert, or other remedial activities, will meet these regulations through a monitoring program and engineering controls, if necessary.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	The cover and Neponset River culvert long-term maintenance, and other remedial measures, will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	The cover and Neponset River culvert long-term maintenance, and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements-of these regulations will be followed to the extent that the alternative involves decommissioning any monitoring wells.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation. Any consolidation of contaminated media from other areas of the site will be managed to meet these standards.

TABLE 12C-2
ARAR Summary for Alternative AOC-2
AOC and Settling Basin #2 Containment Cell: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To Be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	The existing cover will meet the closure/post closure standards to prevent direct human contact with contaminants. Long-term monitoring and institutional controls will ensure that the remedy remains protective.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard, since all asbestos in Settling Basin #2 Containment Cell will be excavated and disposed off-site; and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.. .
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed through excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard since potential hazards caused by exposure to lead contaminated soil will be addressed by excavation and disposal off-site (Settling Basin #2 Containment Cell); and, within the rest of the AOC, addressed through institutional controls, long-term monitoring, security/fencing measures, compliance monitoring for institutional controls, and maintaining the existing protective cover and Neponset River culvert.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes excavation and off-site disposal of the Settling Basin #2 Containment Cell, and long-term monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near a wetland. If there are no practical alternatives to locating fencing, maintenance and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes excavation and off-site disposal of the Settling Basin #2 Containment Cell, and long-term monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near fish and wildlife habitat. There will be consultation with the U.S. Fish and Wildlife Service should remedial activities involve the modification of wetlands or waterways.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practical alternative to excavation and off-site disposal of the Settling Basin #2 Containment Cell wastes and locating monitoring, fencing, maintenance of the cover and Neponset River culvert and other activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there are no practical alternatives to excavation and off-site disposal of Settling Basin #2 Containment Cell wastes and locating monitoring, fencing, maintenance of the cover and Neponset River culvert and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	Remedial structures within the 100-year floodplain, including the cover and Neponset River culvert will be monitored and maintained to prevent the release of contaminated media during a 100-year flood.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, or the South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	Remedial structures, including the cover and Neponset River culvert, within the 100-year floodplain will be maintained to prevent the release of contaminated media within the protected resource area. .

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there is no practicable alternative to excavation and off-site disposal of the Settling Basin #2 Containment Cell, and monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near state wetland resource areas and their buffer zones, then measures will be taken to limit impacts.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	This alternative includes monitoring and maintenance of the existing cover and Neponset River culvert to be performed in or near a regulated waterway. If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects, and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C.. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering of excavations during removal of the Settling Basin #2 Containment Cell and long-term maintenance of the cover or Neponset River culvert, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations during removal of the Settling Basin #2 Containment Cell and long-term maintenance of the Neponset River culvert or cover, is discharged to a POTW.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials handled/covered at the Site. Furthermore, excavation and off-site disposal of wastes, institutional controls, fencing and security measures, along with maintenance and monitoring of the cover and the Neponset River culvert will meet these standards.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing >= 1% materials handled/disposed of at the Site. Furthermore, excavation and off-site disposal of wastes, institutional controls, fencing and security measures, along with maintenance and monitoring of the cover and Neponset River culvert, will meet these standards.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized, and disposed off-site in accordance with these standards. Maintenance of the existing soil and pavement covers on the AOC will meet relevant and appropriate closure/post-closure standards. The clean soil placed at the former location of the Settling Basin #2 Containment Cell will meet relevant and appropriate standards. High pH (i.e., > 12.5) saturated soils and groundwater will remain at depth below the water table and the potential zone of direct contact. Maintaining a protective cover in the area of the excavated Settling Basin #2 Containment Cell, long-term monitoring, and institutional controls will be established to prevent contact with high pH soils and groundwater.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water from removal of the Settling Basin #2 Containment Cell, long-term maintenance, or other remedial activity will be carried out so that it will not cause or contribute to an exceedance of the MSWQS. Any consolidation of contaminated media from other areas of the site will be managed to meet these standards.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of this alternative will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as a part of remedial action including excavation of the Settling Basin #2 Containment Cell, long-term maintenance of the cover and Neponset River culvert, or monitoring, will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Relevant and Appropriate	General facility requirements for closure, post closure, groundwater monitoring, waste analysis, security measures, inspections, and training requirements	Any remedial action completed on hazardous waste, including excavation and backfilling of the Settling Basin #2 Containment Cell, or monitoring, institutional controls, and long-term maintenance of the cover or Neponset River culvert, will meet relevant and appropriate standards. Long-term monitoring and institutional controls will be established to prevent contact with inaccessible hazardous wastes under buildings and in addition to maintaining a protective cover in the area of the excavated Settling Basin #2 Containment Cell. Any hazardous wastes generated will be stabilized and disposed of off-site. All workers will be properly trained.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If, as part of excavation of the Settling Basin #2 Containment Cell, long-term maintenance, or other remedial activities, it is necessary to treat water from excavations contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the requirements of these regulations will be met.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules, Landfill Regulations (310 CMR 30.620)	Relevant and Appropriate	Standards for closure and post-closure of hazardous waste landfills. Since the wastes on Site have been covered in place, certain design and operating requirements listed in 310 CMR 30.622, are not relevant and appropriate to the remedy: a) 310 CMR 30.622(1) & (2) - requirement for a bottom liner; b) 310 CMR 30.622(3) - leak detection, collection, and removal system; and c) 310 CMR 30.622(4) - standards for an upper liner.	Wastes within the Settling Basin #2 Containment Cell will be excavated and disposed of off-site. All other non-asbestos contaminated media throughout the rest of the AOC are under a cover which meets relevant and appropriate standards established under these regulations for: a protective cover, run-on and run-off control, monitoring, and closure and post-closure standards (except for the liner and leak detection closure/post-closure standards that aren't relevant and appropriate).
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers generated as part of this alternative will comply with these requirements.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Excavation water treatment facilities used in conjunction with the removal of the Settling Basin #2 Containment Cell, long-term maintenance, or other remedial activities will meet these regulations through a monitoring program and engineering controls, if necessary.

TABLE 12C-3
ARAR Summary for Alternative AOC-3
AOC and Settling Basin #2 Containment Cell: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	The Settling Basin #2 Containment Cell excavation, cover and Neponset River culvert long-term maintenance, and other remedial measures will be designed, constructed, and operated in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	The Settling Basin #2 Containment Cell excavation, cover and Neponset River culvert long-term maintenance, and other remedial measures will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning any monitoring wells.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation. Any consolidation of contaminated media from other areas of the site will be managed to meet these standards.
State Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To Be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00.	The backfill in the area of the excavated Settling Basin #2 Containment Cell and maintenance and institutional controls over the existing cover over the rest of the AOC will meet the closure/post closure standards to prevent direct human contact with contaminants.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard, since all asbestos within the AOC, including the Settling Basin #2 Containment Cell, will be addressed through excavation and off-site disposal.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants in the AOC, including the Settling Basin #2 Containment Cell, will be addressed through excavation and off-site disposal. Any remnant contamination under buildings will be addressed through institutional controls (soil management plan) and deep, high pH contamination will be addressed by backfilling a protective cover, monitoring and institutional controls.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants in the AOC, including the Settling Basin #2 Containment Cell, will be addressed through excavation and off-site disposal. Any remnant contamination under buildings will be addressed through institutional controls (soil management plan) and deep, high pH contamination will be addressed by backfilling a protective cover, monitoring and institutional controls.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants in the AOC, including the Settling Basin #2 Containment Cell, will be addressed through excavation and off-site disposal. Any remnant contamination under buildings will be addressed through institutional controls (soil management plan) and deep, high pH contamination will be addressed by backfilling a protective cover, monitoring and institutional controls.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants in the AOC, including the Settling Basin #2 Containment Cell, will be addressed through excavation and off-site disposal. Any remnant contamination under buildings will be addressed through institutional controls (soil management plan) and deep, high pH contamination will be addressed by backfilling a protective cover, monitoring and institutional controls.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard because potential hazards due to lead contaminated soil within the AOC, including the Settling Basin #2 Containment Cell, will be addressed through excavation and off-site disposal. Any remnant contamination under buildings will be addressed through institutional controls (soil management plan).

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	All remedial activities that will alter wetlands, particularly excavation and disposal of the AOC/Settling Basin #2 Containment Cell, daylighting of the River, and cover of deep, high pH contamination, will be conducted in accordance with these standards.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and wildlife protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	Since under this alternative there will be excavation and disposal of the AOC/Settling Basin #2 Containment Cell, daylighting of the River, and cover of deep, high pH contamination, to be performed in or near fish and wildlife habitat, there will be consultation with the U.S. Fish and Wildlife Service concerning the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	Since under this alternative there is no practical alternative to excavation and disposal of the AOC/Settling Basin #2 Containment Cell, daylighting of the River, and cover of deep, high pH contamination within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	Since under this alternative there are no practical alternatives to excavation and disposal of the AOC/Settling Basin #2 Containment Cell, daylighting of the River, and cover of deep, high pH contamination within wetlands, then measures will be taken to limit impacts.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release of hazardous waste during a 100-year flood.	Remedial structures within the 100-year floodplain, including the cover over the deep, high pH contamination, will be monitored and maintained to prevent a release of contaminated media during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, or the South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	Remedial structures within the 100-year floodplain, including the installation and maintenance of the cover over the deep, high pH contamination, will be maintained to prevent a release of contaminated media within the protected resource area.
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Since this alternative includes excavation and off-site disposal of the AOC/Settling Basin #2 Containment Cell, daylighting the River, and cover of deep, high pH contamination within wetland resources and their buffer zones, measures will be taken to limit impacts.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	Since this alternative includes excavation and off-site disposal of the AOC/Settling Basin #2 Containment Cell, daylighting the River, and cover of deep, high pH contamination, to be performed in or near a regulated waterway and there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects, and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic former mill tailrace, mill buildings, and South Street bridge. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C.. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from excavation of the AOC and dewatering of excavations during removal of the Neponset River culvert, is discharged to surface water.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering of excavations during removal of the AOC and Neponset River culvert, is discharged to a POTW.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	These standards will be complied with for any asbestos-containing materials excavated/handled as part of this remedial alternative. All asbestos, posing a risk will be removed from the AOC, unless inaccessible, in which case it will be sufficiently covered to meet these standards.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative includes remedial actions in areas containing asbestos. These standards will be complied with for any asbestos-containing >= 1% materials managed, excavated and disposed of off-site.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative.	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of this alternative and wastes left in place will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized and disposed of off-site in accordance with these standards. Confirmatory observations within the excavation will evaluate whether all hazardous waste contaminated materials are removed.. The clean fill cover placed at the former location of the AOC will meet relevant and appropriate standards for closure/post closure. High pH (i.e., > 12.5) saturated soils and groundwater will remain at depth below the water table and the potential zone of direct contact. Institutional controls and monitoring will be established to prevent contact with high pH groundwater. For inaccessible hazardous wastes under buildings, institutional controls (including a soil management plan) will prevent exposure to hazardous waste.
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation water from the remedial action will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of this remedial alternative and wastes left in place will be characterized as hazardous or non-hazardous. Confirmatory observations within in the excavation will evaluate whether all hazardous waste contaminated materials are removed.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal	Hazardous wastes generated as a part of this remedial alternative will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Relevant and Appropriate	General facility requirements for waste analysis, closure, post closure, groundwater monitoring, security measures, inspections, and training requirements	Remedial actions completed on contaminated media, including excavation, stabilization and off-Site disposal of the AOC/Settling Basin #2 Containment Cell, and daylighting the Neponset River, will be conducted in accordance with these requirements. Long-term monitoring and institutional controls will be established to prevent contact with inaccessible hazardous wastes under buildings, in addition to maintaining a protective cover over high pH soils and groundwater. All workers will be properly trained.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If, as part of excavation of contaminated media or the removal of the Neponset River culvert, it is necessary to treat water contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the requirements of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules, Landfill Regulations (310 CMR 30.620)	Relevant and Appropriate	Standards for closure and post-closure of hazardous waste landfills. Since the wastes on Site have been covered in place, certain design and operating requirements listed in 310 CMR 30.622, are not relevant and appropriate to the remedy: a) 310 CMR 30.622(1) & (2) - requirement for a bottom liner; b) 310 CMR 30.622(3) - leak detection, collection, and removal system; and c) 310 CMR 30.622(4) - standards for an upper liner.	All hazardous waste contaminated media within the AOC to the depth of the water table will be excavated and disposed of off-site, except of inaccessible wastes under buildings. The clean fill soil placed at the former location of the AOC will meet relevant and appropriate standards. High pH (i.e., > 12.5) saturated soil and groundwater will remain at depth, below the water table and potential zone of direct contact. Installation and maintenance of a protective cover, long-term monitoring and institutional controls will be established to prevent contact with high pH saturated soils and groundwater. Institutional controls (including a soil management plan) will prevent exposure to inaccessible contamination under buildings.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers generated as part of this alternative will comply with these requirements.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any excavation water treatment facilities used as part of this remedial alternative will meet these regulations through a monitoring program and engineering controls, if necessary.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Daylighting the stream, excavation of soils/contaminated media, removal of the Settling Basin #2 Containment Cell, and construction/maintenance of the cover over the deep, unexcavated, high pH contamination will be implemented in accordance with these rules. No air emissions from remedial treatment will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Daylighting the stream, excavation of soils/contaminated media, removal of the Settling Basin #2 Containment Cell, and construction/maintenance of the cover over the deep, unexcavated, high pH contamination will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Massachusetts Well Decommissioning Standards (313 CMR 3.03)	Applicable	Regulations provide standards to be followed when abandoning a well.	The requirements of these regulations will be followed to the extent that the alternative involves decommissioning any monitoring wells.
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12C-4
ARAR Summary for Alternative AOC-4
AOC and Settling Basin #2 Containment Cell: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts DEP Landfill Technical Guidance Manual	To Be Considered	Provides a standard reference for and guidance on landfill design, construction and QA/QC procedures in accordance with 310 CMR 19.00	Daylighting the stream, excavation of soils/wastes, removal of the Settling Basin #2 Containment Cell, establishment of institutional controls for inaccessible contamination, and construction/maintenance of the cover over the deep, unexcavated, high pH contamination, will meet the closure/post closure standards to prevent direct human contact with contaminants.

TABLE 12D-1
ARAR Summary for Remedial Alternative SSW-1
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: No Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard since risks from asbestos would not be addressed.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in Site media.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in Site media.	This alternative will not meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will not be addressed.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be addressed.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will not meet this standard since potential carcinogenic risks caused by exposure to contaminants will not be addressed.

TABLE 12D-1
ARAR Summary for Remedial Alternative SSW-1
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: No Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will not meet this standard since potential lead hazard at Lot #33-257 will not be addressed.
LOCATION-SPECIFIC				
	None			
ACTION-SPECIFIC				
	None			

TABLE 12D-2
ARAR Summary for Remedial Alternative SSW-2
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will not meet this standard, since risks from asbestos located in Lewis Pond, the floodplain, and the former mill tailrace would not be adequately addressed by institutional controls and fencing/security measures.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in Site media.	This alternative will not meet this standard since potential carcinogenic risks, located in Lewis Pond, the floodplain and the former mill tailrace would not be adequately addressed by institutional controls and fencing/security measures.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in Site media.	This alternative will not meet this standard for exposure to potential non-carcinogenic hazards caused by exposure to contaminants.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will not meet this standard since potential carcinogenic risks located in Lewis Pond, the floodplain and the former mill tailrace would not be adequately addressed by institutional controls and fencing/security measures.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will not meet this standard since potential carcinogenic risks located in Lewis Pond, the floodplain and the former mill tailrace would not be adequately addressed by institutional controls and fencing/security measures.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative would not meet this standard for lead-contaminated soils left in place, because institutional controls (i.e., deed restrictions) and fencing are not considered adequately protective on an active residential property (Lot #33-257).

TABLE 12D-2
ARAR Summary for Remedial Alternative SSW-2
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a reasonable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	This alternative includes work to be performed in or near a wetland. If there are no practical alternatives to locating fencing and other activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and Wildlife Protection (40 C.F.R. §6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes work to be performed in or near wetland and floodplain areas. There will be consultation with the U.S. Fish and Wildlife Service should remedial activities involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to locating fencing and other remedial activities in the 100-year floodplain, then measures will be taken to limit impacts.

TABLE 12D-2
ARAR Summary for Remedial Alternative SSW-2
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there are no practical alternatives to locating fencing and other remedial activities in wetlands, then measures will be taken to limit impacts.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. §469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic Lewis Pond dam and the mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by this standard, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. §470 et seq.); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic Lewis Pond dam and the mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by this standard, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE 12D-2
ARAR Summary for Remedial Alternative SSW-2
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, §40); Wetlands Protection Regulations (310 CMR §10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the Site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	If there are no practical alternatives to locating fencing and other remedial activities in wetlands or their buffer zones, then measures will be taken to limit impacts.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating fencing and other remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Massachusetts Historical Commission (950 CMR §70.00); Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27; Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic Lewis Pond dam and the mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12D-2
ARAR Summary for Remedial Alternative SSW-2
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including posting and disposal standards.	Relevant and appropriate provisions from these standards require any asbestos-containing materials to be properly handled/disposed of at the Site and posting sufficient notice about the presence of asbestos around the asbestos-impacted areas. This alternative will not meet this standard since risks from asbestos, located in Lewis Pond, the floodplain and the former mill tailrace would not be adequately addressed by institutional controls and fencing/security measures.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	This alternative may include fencing and other activities in areas containing asbestos. Any media generated as part of fencing or other activities will be characterized for the presence of asbestos. If determined to contain asbestos, then they will be stored, transported, and disposed off-Site in accordance with these standards. This alternative will not meet this standard since risks from asbestos, located in Lewis Pond, the floodplain and the former mill tailrace would not be adequately addressed by institutional controls and fencing/security measures.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes generated pursuant to this alternative	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. This alternative would not meet this standard for lead-contaminated soils left in place, because institutional controls (i.e., deed restrictions) and fencing are not considered adequately protective on an active residential property (Lot #33-257). Furthermore, these standards would not be met if characteristic hazardous waste is present in contaminated sediments.

TABLE 12D-2
ARAR Summary for Remedial Alternative SSW-2
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Limited Action
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This standard establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of this remedial alternative will be characterized as hazardous or non-hazardous. Contaminated sediments left in place will also be assessed.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-Site disposal	Hazardous wastes generated as part of this remedial alternative will be handled in compliance with the requirements of these regulations
State Requirements	Massachusetts Hazardous Waste Management Rules - Management Standards for all Hazardous Waste Facilities, Closure/Post Closure (310 CMR 30.580-595)	Relevant and Appropriate	These regulations establish standards for closure, post closure, and groundwater monitoring.	This alternative would not meet this standard for lead-contaminated soils left in place, because institutional controls (i.e., deed restrictions) and fencing are not considered adequately protective on an active residential property (Lot #33-257). These standards would also not be met for any hazardous waste contaminated sediments located in Site waterways or Lewis Pond.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	Asbestos contaminated sediments and wetland soils along the Neponset River floodplain and the former mill tailrace would be adequately addressed by excavation and off-Site disposal. However, maintaining only an aqueous cover over Lewis Pond, so that asbestos contaminated soil/sediment remains wet, cannot be certain to prevent human exposure to asbestos contaminated sediment.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in Site media.	Potential carcinogenic risks from contaminated sediment and wetland soils along the Neponset River floodplain and the former mill tailrace would be adequately addressed by excavation and off-Site disposal. However, the aqueous cap over contaminated sediments in Lewis Pond does not adequately address risks.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in Site media.	Potential non-carcinogenic risks from contaminated sediment and wetland soils along the Neponset River floodplain and the former mill tailrace would be adequately addressed by excavation and off-Site disposal. .However, the aqueous cap over contaminated sediments in Lewis Pond does not adequately address risks.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Potential carcinogenic risks from contaminated sediment and wetland soils along the Neponset River floodplain and the former mill tailrace would be adequately addressed by excavation and off-Site disposal. However, the aqueous cap over contaminated sediments in Lewis Pond does not adequately address risks.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	Potential carcinogenic risks from contaminated sediment and wetland soils along the Neponset River floodplain and the former mill tailrace would be adequately addressed by excavation and off-Site disposal. However, the aqueous cap over contaminated sediments in Lewis Pond does not adequately address risks.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard by excavation and off-Site disposal (or on-Site consolidation in AOC) of lead-impacted soil on residential Lot #33-257.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Any remedial activities that will alter wetlands, particularly wetland excavation along the river and long-term maintenance of the dam, will be conducted in accordance with these standards.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and Wildlife Protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	There will be consultation with the U.S. Fish and Wildlife Service since remedial activities, particularly excavation along the river and long-term maintenance of the dam, involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to conducting remedial activities in the 100-year floodplain, then practicable measures will be taken to limit impacts.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	If there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts, including potential restoration.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release during a 100-year flood.	In the event that hazardous waste is present in Lewis Pond sediments the aqueous cap would not prevent a release of hazardous waste during a 100-year flood.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the Site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Remedial activities within wetland resource areas or their buffer zones, particularly wetland excavation along the river and long-term maintenance of the dam, will be conducted in compliance with these standards to limit impacts.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	In the event that hazardous waste is present in Lewis Pond sediments the aqueous cap would not prevent a release of hazardous waste to surface waters.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	Since there are no practical alternatives to locating remedial activities in regulated waterways, particularly excavation along the river and long-term maintenance of the dam, then measures will be taken to meet environmental standards and limit impacts.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, minimize, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Massachusetts Dam Safety Rules and Regulations (302 CMR 10.00)	Applicable	Dam standards set by the height and storage capacity of the dam and by the dam's hazard potential. Establishes safety, operation, maintenance and inspection requirements.	To meet this requirement, the dam must be capable of holding sufficient volume and depth of water to maintain adequate moisture levels in asbestos-contaminated sediment in Lewis Pond so as to prevent the airborne release of asbestos dust throughout the year. Operation and maintenance of the dam needs to be incorporated into the remedial action.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include regulations for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as dewatering or other processing of sediment and wetland soils, or long-term maintenance of the Lewis Pond Dam, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, or long-term maintenance of the Lewis Pond Dam, is discharged to a POTW.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R. § 122.44)	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	Standards to be used for monitoring water quality in Lewis Pond and the Neponset River during sediment/soil excavation, long-term maintenance of the Lewis Pond Dam, or other remedial activities.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	Relevant and appropriate standards will be complied with for any asbestos-containing materials excavated and disposed of off-site as part of this remedial alternative in order to prevent exposure to children. Asbestos-contaminated sediments in Lewis Pond will be covered by an aqueous cap, which would not meet these long-term protectiveness standards.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	These standards will be complied with for any asbestos-containing materials handled/disturbed at the Site. Asbestos-contaminated sediments in Lewis Pond will be covered by an aqueous cap; which would not meet these long-term protectiveness standards.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If excavation or processing of contaminated media, long-term maintenance of the Lewis Pond Dam, or other remedial activities generate regulated air pollutants, then measures will be implemented to meet these standards.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of remedial activities and contaminated media left in place will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Relevant and appropriate requirements of these standards will apply to contaminated media remaining in place. If hazardous waste is present in Lewis Pond sediments closure/post-closure standards would not be met.
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation or process water from the remedial action will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	MA Surface Water Quality Standards (314 CMR 4.00)	Applicable	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Water quality standards to be used for monitoring water quality in Lewis Pond and the Neponset River during remedial activities, including soil/sediment excavation, long-term monitoring, and long-term maintenance of the Lewis Pond Dam.
State Requirements	MA Water Quality Certification for Discharge of Dredged or Fill Material (314 CMR 9.00)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a reasonable alternative with lesser effects is available. If activity takes place, adverse impacts must be minimized. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Remedial activities, including soil/sediment excavation and handling, long-term monitoring, and long-term maintenance of the Lewis Pond Dam, will occur in and around Site wetlands. These actions will be designed to limit adverse effects and to preserve, mitigate, and restore disturbed areas.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable for wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of the remedial action and contaminated media left in place will be characterized as hazardous or non-hazardous.

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-Site disposal.	Hazardous wastes generated as part of the remedial action will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities, Closure/Post Closure (310 CMR 30.500)	Relevant and Appropriate for contaminated media left in place. Applicable for hazardous wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	These regulations establish standards for closure, post closure, and groundwater monitoring.	If this alternative involves treatment of hazardous waste, then it will be conducted in accordance with this requirement. All workers would be properly trained. If excavated soil/sediment is considered hazardous waste, it would be stabilized and disposed of off-Site. If hazardous waste is present in Lewis Pond sediments, closure/post-closure standards would not be met.
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If as part of this remedial action, it is necessary to treat water contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the standards of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for the holding contaminated soil, sediment, water or other waste will comply with these requirements

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed if tanks are used to store or treat hazardous wastes generated as part of this alternative. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any water treatment facilities used as part of this remedial alternative will meet these regulations through a monitoring program and engineering controls, if necessary.
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation and processing of soil/sediment, and long-term maintenance of the Lewis Pond Dam, will be implemented in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Remedial activities, including excavation and processing of soil/sediment, and long-term maintenance of the Lewis Pond Dam, will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).

TABLE 12D-3
ARAR Summary for Alternative SSW-3
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard, since all asbestos contaminated sediments and wetland soils upstream of Lewis Pond will be addressed by excavation and off-Site disposal; or for Lewis Pond, by installing a subaqueous cap over asbestos contaminated soil/sediment, and through institutional controls.
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in Site media.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants in sediment/soil upstream of Lewis Pond will be addressed by excavation and off-Site disposal; or for Lewis Pond, by covering contaminated sediment with a subaqueous cap, and through institutional controls, as long as the cap can be designed to prevent release of hazardous wastes, if present.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in Site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants in sediment/soil upstream of Lewis Pond will be addressed by excavation and off-Site disposal; or for Lewis Pond, by covering contaminated sediment with a subaqueous cap, and through institutional controls, as long as the cap can be designed to prevent release of hazardous wastes, if present.
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants in sediment/soil upstream of Lewis Pond will be addressed by excavation and off-Site disposal; or for Lewis Pond, by covering contaminated sediment with a subaqueous cap, and through institutional controls, as long as the cap can be designed to prevent release of hazardous wastes, if present.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance for assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants in sediment/soil upstream of Lewis Pond will be addressed by excavation and off-Site disposal; or for Lewis Pond, by covering contaminated sediment with a subaqueous cap, and through institutional controls, as long as the cap can be designed to prevent release of hazardous wastes, if present.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard by excavation and off-Site disposal of lead-impacted soil on residential Lot #33-257.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be limited to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Any remedial activities that will alter wetlands, particularly excavation of wetlands upstream of Lewis Pond and subaqueous capping of sediments within Lewis Pond, will be conducted in accordance with these standards.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and Wildlife Protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	There will be consultation with the U.S. Fish and Wildlife Service since excavation of contaminated soil and sediment upstream of Lewis Pond, and subaqueous capping of sediments within Lewis Pond will involve the modification of wetlands or waterways.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there is no practicable alternative to conducting remedial activities within the 100-year floodplain, then measures will be taken to limit harm to and preserve beneficial values of floodplains. There may be difficulties replacing lost flood storage capacity within Lewis Pond, due to subaqueous capping. O&M and long-term monitoring of the subaqueous cap required to prevent release of contaminants into the waterway.
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be limited to the maximum extent.	If there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts, including potential restoration. O&M and long-term monitoring of the subaqueous cap required to prevent release of contaminants into the waterway.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. § 6901 *et seq.*), Hazardous Waste Facility Standards Within a Floodplain (40 C.F.R. 264.18(b)	Relevant and Appropriate	Any hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent a release during a 100-year flood.	The subaqueous cap installed over sediments in Lewis Pond will be designed, constructed, operated and maintained to limit the likelihood of a release of contaminated media during a 100-year flood. The excavation of lead and asbestos-contaminated soil from the floodplain in Lot #33-257 will be conducted to prevent any release of contaminants.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 *et seq.*); National historic landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic Lewis Pond dam and the former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the Site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Any remedial activities that will alter wetlands and their buffer zones, particularly excavation of wetlands upstream of Lewis Pond and capping sediments within Lewis Pond, will be conducted in accordance with these standards.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Massachusetts Hazardous Waste Rules, Facility Location Standards (310 CMR 30.700)	Relevant and Appropriate	Sets forth criteria for siting hazardous waste facilities within Land Subject to Flooding (as defined under the Massachusetts Wetlands Protection standards); surface water supplies; and actual, planned, or potential public water supplies.	The subaqueous cap installed over sediments in Lewis Pond will be designed, constructed, operated and maintained to limit the likelihood of a release of contaminated media during a 100-year flood. The excavation of lead and asbestos-contaminated soil from the floodplain in Lot #33-257 will be conducted to prevent any release of contaminants.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, limit, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic Lewis Pond dam and the former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.
State Requirements	Massachusetts Dam Safety Rules and Regulations (302 CMR 10.00)	Applicable	Dam standards set by the height and storage capacity of the dam and by the dam's hazard potential. Establishes safety, operation, maintenance and inspection requirements.	To meet this requirement, the dam must be capable of holding sufficient volume and depth of water to protect the subaqueous cap in Lewis Pond throughout the year. Operation and maintenance of the dam needs to be incorporated into the remedial action.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include regulations for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, is discharged to a POTW.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R. § 122.44)	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	Standards to be used for monitoring water quality in Lewis Pond and the Neponset River during sediment/soil excavation, subaqueous cap placement, long-term monitoring of the subaqueous cap and other remedial activities.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	Relevant and appropriate standards will be complied with for any asbestos-containing materials excavated and disposed of off-site as part of this remedial alternative in order to prevent exposure to children. Asbestos-contaminated sediments in Lewis Pond will be covered with a subaqueous cap, which will be subject to long-term O&M and monitoring to prevent exposure, and contaminated soils and sediments upstream of Lewis Pond will be excavated and disposed of off-site.
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Relevant and Appropriate	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal sites are established. Advance EPA notification of the intended disposal site is required.	These standards will be complied with for any asbestos-containing materials handled/disturbed/disposed of at the Site. Asbestos contaminated sediments in Lewis Pond will be addressed by covering sediments with a subaqueous cap, which will be subject to long-term O&M and monitoring, and contaminated soils and sediments upstream of Lewis Pond will be excavated and either disposed of off-site.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If excavation or processing of contaminated media, installing a subaqueous cap, or other remedial activities generate regulated air pollutants then measures will be implemented to meet these standards.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C- Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place; Applicable for hazardous wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Wastes generated as part of remedial activities and contaminated media left in place will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, transported, and disposed of in accordance with these standards. Sediments in Lewis Pond will be evaluated as part of the remedial design of the subaqueous cap. Relevant and appropriate requirements of these standards will apply to the construction, monitoring, and maintenance of the subaqueous cap in the event that hazardous waste contaminated sediments remain in Lewis Pond.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
Feasibility Study
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation or process water from the remedial action will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	MA Surface Water Quality Standards (314 CMR 4.00)	Applicable	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Water quality standards to be used for monitoring water quality in Lewis Pond and the Neponset River during remedial activities, including soil/sediment excavation and installation and long term O&M of the subaqueous cap.
State Requirements	MA Water Quality Certification for Discharge of Dredged or Fill Material (314 CMR 9.00)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a reasonable alternative with lesser effects is available. If activity takes place, adverse impacts must be limited. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Remedial activities, including soil/sediment excavation and handling, and installation, long-term O&M, and monitoring of a subaqueous cap, will occur in and around Site wetlands. These actions will be designed to limit adverse effects and to preserve, mitigate, and restore disturbed areas.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Wastes generated as part of the remedial action and contaminated media left on site, will be characterized as hazardous or non-hazardous. Sediments in Lewis Pond will be evaluated as part of the remedial design of the subaqueous cap.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-Site disposal	Hazardous wastes generated as part of the remedial action, will be handled in compliance with the requirements of these regulations.
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Relevant and Appropriate for wastes left in place. Applicable for hazardous wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	These regulations establish standards for closure, post closure, and groundwater monitoring.	If this alternative involves treatment of hazardous waste, then it will be conducted in accordance with this requirement. All workers would be properly trained. If excavated soil/sediment is considered hazardous waste, it would be stabilized and disposed of off-Site. Relevant and appropriate requirements of these standards will apply to contaminated media remaining in place (potentially the capped Lewis Pond sediments)...

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If as part of this remedial action, it is necessary to treat water contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the standards of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for the holding contaminated soil, sediment, water or other waste will comply with these requirements
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	This alternative may include storage or treatment of wastes in tanks. Design and installation requirements will be followed if tanks are used to store or treat hazardous wastes generated as part of this alternative. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any water treatment facilities used as part of this remedial alternative will meet these regulations through a monitoring program and engineering controls, if necessary.

TABLE 12D-4
ARAR Summary for Alternative SSW-4
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation and processing of soil/sediment, and installation, O&M, and long-term monitoring of the subaqueous cap, will be implemented in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	Remedial activities, including excavation and processing of soil/sediment, and installation, O&M, and long-term monitoring of the subaqueous cap, will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
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AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Clarifying Cleanup Goals and Identification of New Assessment Tools for Evaluating Asbestos at Superfund Cleanups	To Be Considered	EPA guidance on developing cleanup goals for asbestos.	This alternative will meet this standard, since all asbestos contaminated sediments and wetland soils will be addressed by excavation/dredging and off-Site disposal
Federal Requirements	Cancer Slope Factors (CSF)	To Be Considered	Guidance used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in Site media.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal.
Federal Requirements	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in Site media.	This alternative will meet this standard since potential non-carcinogenic hazards caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal).
Federal Requirements	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	This alternative will meet this standard since potential carcinogenic risks caused by exposure to contaminants will be addressed by excavation/dredging of contaminated soil/sediment and off-Site disposal.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC				
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil.	This alternative will meet this standard by excavation of lead-impacted soil on residential Lot #33-257, and off-Site disposal.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Clean Water Act, Sec 404 (33 U.S.C. § 1344); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be limited to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Any remedial activities that will alter wetlands, particularly the excavation of contaminated wetland soils and sediments, will be conducted in accordance with these standards. Since all contaminants will be removed under this alternative, this is the least damaging practicable alternative to the long-term protection of wetland resources at the Site.
Federal Requirements	Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*); Fish and Wildlife Protection (40 C.F.R. § 6.302(g))	Applicable	Any modification of a body of water requires consultation with the U.S. Fish and Wildlife Service and the appropriate state wildlife agency to develop measures to prevent, mitigate or compensate for losses of fish and wildlife.	This alternative includes work to be performed in or near wetland and floodplain areas. There will be consultation with the U.S. Fish and Wildlife Service since excavation of contaminated soils in sediments will involve the modification of wetlands or waterways.
Federal Requirements	Floodplain Management (40 C.F.R. 6.302(b); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11988. This standard requires action to avoid the long- and short-term impacts associated with the occupancy and modifications related to floodplain development, wherever there is a practicable alternative. Promotes the preservation and restoration of floodplains so that their natural and beneficial value can be realized.	If there are no practical alternatives to remedial activities in the 100-year floodplain, then measures will be taken to limit impacts.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
Federal Requirements	Protection of Wetlands (40 C.F.R. § 6.302(a); Appendix A)	Applicable	This regulation codifies standards established under Executive Order 11990. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be limited to the maximum extent.	Since there is no practicable alternative to taking remedial actions within wetlands, then measures will be taken to limit impacts, including potential restoration.
Federal Requirements	Historic Sites Act of 1935 (16 U.S.C. § 469 et seq.); National Historic Landmarks (36 C.F.R. Part 65)	Applicable	The purpose of the National Historic Landmarks program is to identify and designate National Historic Landmarks, and encourage the long range preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact historic properties/structures determined to be protected by these standards, activities will be coordinated with the Department of the Interior.
Federal Requirements	National Historic Preservation Act of 1966 (16 U.S.C. § 470 *et seq.*); Protection of Historic Properties (36 C.F.R. Part 800)	Applicable	Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact properties/structures determined to be protected by these standards, activities will be coordinated with the Advisory Council on Historic Preservation.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
LOCATION-SPECIFIC				
State Requirements	Wetlands Protection Act (Mass. Gen. Laws ch. 131, § 40); Wetlands Protection Regulations (310 CMR § 10.00)	Applicable	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 200 feet of a river). Resource areas at the Site covered by the regulations include stream banks, bordering vegetated wetlands, land under bodies of water, land subject to flooding, and riverfront.	Any remedial activities that will alter wetlands and their buffer zones, particularly excavation of contaminated soils and sediments along the Neponset River and within Lewis Pond, will be conducted in accordance with these standards.
State Requirements	Public Waterfront Act (Mass. Gen. Laws ch. 91); Waterways regulations (310 C.M.R. 9.00)	Applicable	Sets forth criteria for work within waterways, below the high water mark, designated by the State (including the Neponset River).	If there are no practical alternatives to locating remedial activities in regulated waterways, then measures will be taken to meet environmental standards and limit impacts.
State Requirements	Antiquities Act and Regulations (Mass. Gen. Laws. ch. 9, §§26-27); Massachusetts Historical Commission (950 CMR §70.00); Protection of Properties Included in the State Register of Historic Places (950 CMR §71.00)	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, limit, or mitigate adverse effects to properties listed in the register of historic places. Establishes requirements for review of impacts for state-funded or state-licensed projects and projects on state-owned property. Establishes state register of historic places. Establishes coordination with the National Historic Preservation Act.	This alternative includes work near the potentially historic Lewis Pond dam and former mill tailrace. Archeological or cultural resources may also be present. Features with potential historical/cultural significance will be evaluated during the remedial design phase. Should this alternative impact the historical, architectural, archaeological, or cultural qualities of a property determined to be protected by these standards, whether listed or not, activities will be coordinated with the Massachusetts Historical Commission.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Water Act, (33 U.S.C. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	These standards include requirements for remedial wastewater discharges to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, is discharged to surface waters.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 *et seq.*); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of groundwater into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering or other processing of sediment and wetland soils, is discharged to a POTW.
Federal Requirements	Clean Water Act (33 U.S.C. § 1251 et seq.); National Recommended Water Quality Criteria ("NRWQC") (40 C.F.R. § 122.44)	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	Standards to be used for monitoring water quality in Lewis Pond and the Neponset River during the remedial activities, including excavation/dredging of soil/sediment.
Federal Requirements	Toxic Substances Control Act; Asbestos-Containing Materials in Schools (40 C.F.R. 763, Subpart E, Appendix D)	Relevant and Appropriate	Standards for addressing the transportation and disposal of asbestos contamination specifically from schools. Appendix D is guidance for asbestos waste management, including disposal standards.	Relevant and appropriate standards will be complied with for any asbestos-containing materials excavated and disposed of either on or off-site as part of this remedial alternative in order to prevent exposure to children.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
Federal Requirements	Clean Air Act; National Emission Standard for Asbestos, Subpart M (40 C.F.R. Part 61.150, 61.151)	Applicable	Provides standards for packaging, transport and disposal of materials that contain asbestos. Disposal requirements for asbestos disposal Sites are established. Advance EPA notification of the intended disposal Site is required.	These standards will be complied with for any asbestos-containing materials excavated/handled at the Site. In particular, dewatering of any sediment or wetland soils will be conducted so as to not release asbestos back into the environment.
Federal Requirements	Clean Air Act (CAA) (42 U.S.C. § 112(b)(1)), National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	Relevant and Appropriate	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	If remedial activities, including excavation/dredging or processing of contaminated soil/sediment, generates regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Resource Conservation and Recovery Act (RCRA)(42 U.S.C. §6901 *et seq.*), Subtitle C-Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure (40 C.F.R. Parts 260-262 and 264)	Relevant and Appropriate for contaminated media left in place. Applicable for hazardous wastes (e.g., excavated soil/sediment) generated pursuant to this alternative	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State.	Soils/sediments will be evaluated prior to their dredging/excavation to ensure all hazardous waste contaminated soils/sediments will be removed. Wastes generated as part of remedial activities will be characterized as hazardous or non-hazardous. If determined to be hazardous, waste will be stored, stabilized, transported, and disposed of in accordance with these standards.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Clean Water Act (MGL ch 21 sections 26-53); Surface Water Discharge Permit Regulations (314 CMR 3.00)	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharge to surface waters of excavation/dredging or process water from the remedial action will be carried out so that it will not cause or contribute to an exceedance of the MSWQS.
State Requirements	MA Surface Water Quality Standards (314 CMR 4.00)	Applicable	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Water quality standards to be used for monitoring water quality in Lewis Pond and the Neponset River during remedial activities, including excavation/dredging of soil/sediment.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	MA Water Quality Certification for Discharge of Dredged or Fill Material (314 CMR 9.00)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a reasonable alternative with lesser effects is available. If activity takes place, adverse impacts must be limited. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Remedial activities, including excavation/dredging and handling of soil/sediment, will occur in and around Site wetlands. These actions will be designed to limit adverse effects and to preserve, mitigate, and restore disturbed areas.
State Requirements	Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes (310 CMR 30.100)	Applicable	This establishes requirements for determining whether wastes are hazardous.	Sampling will identify all hazardous waste on site that will be excavated and disposed of offsite. Wastes generated as part of remedial activities will be characterized as hazardous or non-hazardous.
State Requirements	Massachusetts Hazardous Waste Management Rules - Requirements for Generators (310 CMR 30.300)	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-Site disposal (or on-Site consolidation in the AOC).	Hazardous wastes generated as part of remedial activation, will be handled in compliance with the requirements of these regulations
State Requirements	Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 CMR 30.500)	Applicable	General facility requirements for waste analysis, security measures, inspections, and training requirements	Any remedial action completed on hazardous waste will be conducted in accordance with this requirement. All workers would be properly trained. If excavated soil/sediment is considered hazardous waste, it will be stabilized and disposed of off-Site.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units (310 CMR 30.605)	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	If as part of this remedial action, it is necessary to treat water contaminated with hazardous wastes prior to discharge to surface waters or a POTW, the standards of these regulations will be met.
State Requirements	Massachusetts Hazardous Waste Rules - Containers (310 CMR 30.680)	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used for the holding contaminated soil/sediment, water or other waste will comply with these requirements.
State Requirements	Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks (310 CMR 30.690)	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	Design and installation requirements will be followed if tanks are used to store or treat hazardous wastes generated as part of this alternative. Specifications will include secondary containment, if necessary.
State Requirements	Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities (314 CMR 8.03)	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation	Any water treatment facilities used as part of this remedial alternative will meet these regulations through a monitoring program and engineering controls, if necessary.

TABLE 12D-5
ARAR Summary for Alternative SSW-5
Former Mill Tailrace, Neponset River Floodplain, and Lewis Pond: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
ACTION-SPECIFIC				
State Requirements	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation/dredging and processing of soil/sediment, will be implemented in accordance with these rules. No air emissions from remedial activities will cause ambient air quality standards to be exceeded. Dust standards will be complied with during excavation of materials at the Site.
State Requirements	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards	Remedial activities, including excavation/dredging and processing of soil/sediment, will be managed to meet the standards for visible emissions (310 CMR 7.06), dust, odor and demolition (310 CMR 7.09), noise (310 CMR 7.10), and asbestos (310 CMR 7.15).
State Requirements	Erosion and Sediment Control Guidance	To Be Considered	Standards for preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

TABLE 13A

Summary of Costs for Remedial Alternatives SW-1 through SW-3
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	Present Worth Analysis		
	SW-1: No Action	**SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Capital Cost	$0	$90,000	$1,700,000
Total Annual O&M Cost (7% discount rate)	$0	$2,100,000	$5,100,000
Total Periodic Cost (7% discount rate)	$32,000	$160,000	$120,000
Total Present Value (7% discount rate)	$32,000	$2,400,000	$7,000,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for SW-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE 13B

Summary of Costs for Remedial Alternatives SO-1 through SO-6
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	Present Worth Analysis					
	SO-1: No Action	**SO-2: Limited Action**	**SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**SO-4: Limited Excavation**	**SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**SO-6: Comprehensive Excavation and Off-Site Disposal**
Capital Cost	$0	$240,000	$150,000	$220,000	$1,100,000	$2,010,000
Total Annual O&M Cost (7% discount rate)	$0	$630,000	$200,000	$0	$540,000	$0
Total Periodic Cost (7% discount rate)	$32,000	$89,000	$180,000	$32,000	$32,000	$32,000
Total Present Value (7% discount rate)	$32,000	$960,000	$500,000	$250,000	$1,700,000	$2,040,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for SO-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE 13C

Summary of Costs for Remedial Alternatives AOC-1 through AOC-4
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	Present Worth Analysis			
	AOC-1: No Action	**AOC-2: Limited Action**	**AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Capital Cost	$0	$15,000	$500,000	$12,000,000
Total Annual O&M Cost (7% discount rate)	$0	$330,000	$330,000	$330,000
Total Periodic Cost (7% discount rate)	$32,000	$67,000	$67,000	$67,000
Total Present Value (7% discount rate)	$32,000	$412,000	$900,000	$12,000,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for AOC-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE 13D

Summary of Costs for Remedial Alternatives SSW-1 through SSW-5
Feasiblity Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

	Present Worth Analysis				
Criteria: Cost	**SSW-1: No Action**	**SSW-2: Limited Action**	**SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Capital Cost	$0	$310,000	$1,000,000	$1,400,000	$3,100,000
Total Annual O&M Cost (7% discount rate)	$0	$190,000	$230,000	$110,000	$0
Total Periodic Cost (7% discount rate)	$32,000	$82,000	$43,000	$46,000	$14,000
Total Present Value (7% discount rate)	$32,000	$580,000	$1,300,000	$1,600,000	$3,100,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (i.e., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs. Periodic costs for SSW-1 (five-year reviews) taken from those calculated for other alternatives.

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Overall Protection of Human Health and the Environment	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Protection of Human Health	Not protective of human health because no measures to prevent ingestion/dermal contact/inhalation with groundwater used as tap water with contaminant of concern (COC) concentrations greater than preliminary remediation goals (PRGs), nor does this alternative prevent dermal contact by a future construction worker or current/future wader with groundwater or surface water with elevated pH conditions.	Establishment of institutional controls, such as a deed restriction that: prohibits use of Site groundwater as tap water, establishes a compliance boundary around the SO and AOC waste management areas, and prohibits wading/fishing in the Former Mill Tailrace; and installation and maintenance of fencing surrounding the Former Mill Tailrace, provide protection of human health by preventing exposure to groundwater and surface water COCs with concentrations greater than PRGs. Groundwater and surface water monitoring would be required to confirm that human receptors are not exposed to groundwater or surface water COCs at concentrations exceeding PRGs.	Establishment of institutional controls, such as a deed restriction that prohibits use of Site groundwater as tap water and establishes a compliance boundary around the waste management areas, provides protection of human health by preventing exposure to groundwater COCs with concentrations greater than PRGs. Installation of groundwater collection and treatment measures to prevent contaminated groundwater discharge to the Former Mill Tailrace provides protection of human health. Groundwater and surface water monitoring would be required to confirm that human receptors are not exposed to groundwater or surface water COCs. Further, the protection of human health from surface water exposures is dependant upon the successful and long-term operation of a groundwater collection and treatment system.
Protection of the Environment	Not protective of the environment since surface water quality standards to protect ecological receptors will not be met.	Not protective of the environment since surface water quality standards to protect ecological receptors will not be met	Protective of the environment since installation of the groundwater collection and treatment measure will prevent contaminated groundwater from impairing the water quality of the Former Mill Tailrace, thereby protecting ecological receptors. Where wetlands are disturbed as part of this alternative (e.g., construction of a surface water outfall for treated groundwater in the Former Mill Tailrace), the potential disturbances to wetlands would be mitigated.

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Chemical-Specific ARARs	This alternative does not address groundwater or surface water contamination; therefore, it does not comply with chemical-specific ARARs.	Groundwater outside the compliance boundary for the waste management areas is currently, and would continue to be in compliance with chemical specific ARARs identified in Table 12A. Groundwater within the compliance boundary would meet chemical-specific ARARs by implementing institutional controls to preclude exposure to potential receptors. This alternative will not meet the requirements of the CWA and NRWQC, or the MSWQS, since concentrations of surface water in the Former Mill Tailrace will remain above these water quality standards in these regulations.	Groundwater outside the compliance boundary for the waste management areas is currently, and would continue to be in compliance with chemical specific ARARs identified in Table 12A. Groundwater within the compliance boundary would meet chemical-specific ARARs by implementing institutional controls to preclude exposure to potential receptors. Surface water in the Former Mill Tailrace would be in compliance with chemical specific ARARs.
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	The measures contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12A. Coordination with appropriate regulatory agencies would be completed to confirm compliance with these ARARs, as necessary.	The measures contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12A. In particular, construction activities in the wetlands, floodplain, or surface water bodies near the Former Mill Tailrace would be completed in a manner that addresses impacts to wetlands, the floodplain, and/or surface water bodies. Coordination with appropriate regulatory agencies would be completed to confirm general compliance with these ARARs, as necessary.
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	The activities implemented as part of this alternative would be completed in a manner that is compliant with some of the action-specific ARARs identified in Table 12A (e.g., waste listing, waste generation, groundwater protection standards). However, this alternative would not meet the requirements of the state and federal RCRA closure and post-closure standards, since institutional controls and fencing alone will not address migration of contaminants to groundwater and surface water that results in exceedances of surface water quality criteria in the Former Mill Tailrace.	The activities implemented as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the action-specific ARARs identified in Table 12A (e.g., surface water discharge standards, waste listing, waste generation, groundwater protection standards, TSCA standards related to transport and disposal of asbestos-impacted soil/sediment, closure/post closure standards, etc.).

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Long-Term Effectiveness and Permanence	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent.	Institutional controls, such as a deed restriction that: prohibits use of Site groundwater as tap water, establishes the compliance boundary around the waste management areas, prevents the use of groundwater within the compliance boundary, and prohibits wading/fishing in the Former Mill Tailrace; and installation and maintenance of fencing surrounding these areas, are effective means of removing the exposure pathways for groundwater and surface water, and hence eliminating potential human health risks. However, environmental risks from impaired water quality would not be addressed. Contamination would remain on-Site; therefore, five-year reviews would be required.	Institutional controls, such as a deed restriction that: prohibits use of Site groundwater as tap water, and establishes the compliance boundary around the waste management areas, are effective means of removing the exposure pathways for groundwater, and hence eliminating potential groundwater risks. Yearly compliance monitoring would ensure institutional controls remain in effect. The groundwater collection and treatment system will adequately address potential surface water-related human health risk and environmental impairment in the Former Mill Tailrace in less than one month from start-up of the groundwater collection and treatment system. Contamination would remain on-Site; therefore, five-year reviews would be required.
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative.	When properly established and implemented, institutional controls and fencing provide adequate and reliable measures as long-term effective groundwater and surface water remedies for human health exposure, but not environmental exposure, particularly when combined with a groundwater and surface water monitoring program, compliance monitoring, quarterly inspections, and five-year reviews. However, implementation of these measures is dependant upon cooperation of affected property owners, in the case of deed restrictions, and some types of institutional controls, such as local by-laws restricting groundwater use, may require regulatory enforcement. In particular, precluding exposure to surface water for a period of possibly greater than 100 years by fencing and institutional controls on residential property may be difficult in the long-term.	When properly established and implemented, institutional controls provide adequate and reliable measures as a long-term effective groundwater remedy, particularly when combined with a groundwater monitoring program, compliance monitoring, quarterly inspections, and five-year reviews. While the groundwater collection and treatment system generally consists of well-proven technologies, the adequacy and reliability of the system for protection of surface water is dependant upon proper operation, monitoring, and maintenance of the groundwater collection and treatment system. This system could be operated for greater than 100 years. Surface water quality monitoring will also completed to evaluate the effectiveness of the alternative.

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Treatment Process	None	None	Metals in groundwater would be removed by pH adjustment, ion exchange, and greensand filtration. Organic chemicals in groundwater would be removed by liquid phase granular activated carbon (GAC). The groundwater pH would be adjusted by addition of acid. There is no treatment of site-wide groundwater contamination.
Volume Treated	None	None	A design flow rate of approximately 10 gpm (equals approximately 5.3×10^8 gallons over the 100-year operational period of the system).
Reduction of Toxicity, Mobility and/or Volume	None	None	The pH would be reduced, and metals and organics would be removed from groundwater that discharges to the Former Mill Tailrace. The remaining contaminated groundwater throughout the Site will not be treated.
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	Metals and organics removal from Site groundwater discharging to the Former Mill Tailrace would be permanent. Extracted metals from pH adjustment/greensand filtration would be treated / disposed off-Site in filter cartridges. Metals extracted by ion exchange resins would be treated and/or disposed off-Site. Organics from the GAC would be sent off-Site for treatment and/or disposal.
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	An estimated 24 55-gallon drums of filter cartridges with metals residuals would be generated per year. Approximately 1,800 pounds of spent ion exchange resin would be generated per year. Approximately 7,200 pounds of spent GAC would be generated per year.
Attainment of Statutory Preference for Treatment	No	No	Contaminated groundwater would be collected and treated to prevent its migration and discharge to the Former Mill Tailrace, but there would be no treatment of the remaining contaminated groundwater throughout the Site. Hence, this alternative partially satisfies the statutory preference for treatment as a principal element of the remedial solution. Long-term operation of the groundwater collection and treatment system would be necessary.

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Community Protection	No additional risks beyond those posed by current conditions.	No additional risks beyond those posed by current conditions.	Engineering controls to limit potential fugitive dust associated with construction activities would be implemented as necessary.
Worker Protection	No additional risks beyond those posed by current conditions.	Risks to workers performing monitoring, well repair/installation, fence repair, quarterly inspections, and 5-year reviews can be controlled and mitigated with proper health and safety measures.	Risks to workers performing construction activities, system maintenance, waste disposal, monitoring, well repair/installation, fence repair, quarterly inspections, and 5-year reviews can be controlled and mitigated with proper health and safety measures.
Environmental Impacts	No additional risks beyond those posed by current conditions.	Any minor impacts due to fence installation will be mitigated.	Installation of a groundwater collection and treatment system would likely reduce groundwater flow conditions to the Former Mill Tailrace, which contains surface water and wetlands. However, discharge of treated groundwater to the Former Mill Tailrace would directly provide additional surface water flow.
Time to Achieve RAOs	With no institutional controls or remedial measures implemented, groundwater and surface water COCs could remain at concentrations greater than PRGs for greater than 100 years.	Institutional and access controls would achieve groundwater and surface water RAOs for human health risks immediately upon implementation of this measure.	Institutional controls would achieve groundwater RAOs immediately upon implementation of this measure. Clean-up of surface water to PRGs is expected to take approximately one month from start-up of the groundwater collection and treatment system. However, operation and maintenance of the system may be required for 100 years or more to maintain compliance with surface water PRGs

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-3: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative.	Well maintenance/drilling, fence maintenance, and groundwater and surface water sampling are standard activities that are routinely implemented.	Well maintenance/drilling, and groundwater and surface water sampling are standard activities that are routinely implemented. In addition, the groundwater collection and treatment system consists of methods / components that are routinely constructed and operated. However the effective long-term (i.e., potentially 100 years or more) operation and maintenance of this system requires substantial on-going effort. The long-term operations requirements (i.e., replacement of failed components) are uncertain.
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative	Well maintenance/drilling, fence maintenance, and groundwater and surface water sampling can be completed with proven reliable technologies. However, the reliability of maintaining fencing and enforcing institutional controls on residential property for a period of greater than 100 years is questionable.	Well maintenance/drilling, and groundwater and surface water sampling can be completed with proven reliable technologies. In addition, the groundwater collection and treatment system consists of proven and reliable methods / components. However the effective long-term (i.e., potentially 100 years or more) operation and maintenance of this system requires substantial on-going effort. The long-term operations requirements (i.e., replacement of failed components) are uncertain.
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Modifications to the groundwater collection and treatment system could be added if warranted based on system performance and/or monitoring data.
Monitorability	No monitoring would be undertaken as part of this alternative other than conducting Five-Year Reviews.	Groundwater and surface water monitoring, quarterly Site inspections, yearly compliance monitoring, and five-year reviews enable the Site groundwater and surface water conditions and institutional controls to be effectively monitored.	Groundwater and surface water monitoring, groundwater treatment system effluent monitoring, quarterly inspections, and five-year reviews enable the Site groundwater and surface water conditions to be effectively monitored. Yearly compliance monitoring of institutional controls can be effectively conducted.
Administrative Feasibility	There are no administrative issues with this alternative.	Establishment of groundwater compliance boundary around the waste management areas and establishment of other institutional controls, and continued access to Site monitoring wells and surface water sample locations requires the cooperation of affected property owners and enforcement by regulators. Depending on the precise natural of the institutional controls, regulatory action, such as enactment of local by-laws, may also be required.	Establishment of a compliance boundary around the waste management areas and establishment of other institutional controls, and continued access to Site monitoring wells and surface water sample locations requires the cooperation of affected property owners. Depending on the precise nature of the institutional controls, regulatory action, such as enactment of local by-laws, may also be required.
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative.	Several facilities are currently able to accept the quantities of materials (purge water from sampling activities, and drill cuttings from well replacement activities) requiring off-Site treatment / disposal as part of this alternative.	Several facilities are currently able to accept the quantities of materials (groundwater treatment residuals, purge water from sampling activities, drill cuttings from well replacement activities, and soil from installation of the groundwater collection trench) requiring off-Site treatment / disposal as part of this alternative. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment.
Availability of Personnel, Equipment, and Materials	Personnel, equipment, or materials would be available to conduct Five-Year Reviews.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative.	Well maintenance/drilling technologies, fence maintenance methods, and groundwater and surface water sampling and analysis technologies are well established.	Well maintenance/drilling technologies, groundwater and surface water sampling and analysis, and the groundwater collection and treatment technologies are well established.

TABLE 14A
Individual Analysis of SW-1 through SW-3 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Alternatives**		
	Alternative SW-1: No Action	**Alternative SW-2: Limited Action**	**Alternative SW-4: Groundwater Collection with Ex-Situ Treatment of Groundwater**
Capital Cost	$0	$90,000	$1,700,000
Total Annual O&M Cost (7% discount rate)	$0	$2,100,000	$5,100,000
Total Periodic Costs (7% discount rate)	$32,000	$160,000	$120,000
Total Present Value (7% discount rate)	$32,000	$2,400,000	$7,000,000

1. The costs are generally rounded to two significant figures.
2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.
3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e.g., routine operation, maintenance, and monitoring).
4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).
5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.
6. Refer to the text and appendices of this report for additional information regarding costs.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Overall Protection of Human Health and the Environment	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Protection of Human Health	Not protective of human health because no measures would be taken to prevent ingestion/dermal contact with soil that has contaminant of concern (COC) concentrations exceeding human health risk levels.	There are no risks to current receptors in the SO Area. Establishment of institutional controls, such as deed restrictions; installing and maintaining fencing; long-term monitoring; and monitoring of soil vapor would not provide protection for the currently allowed uses of the site.	There are no risks to current receptors in the SO Area. Institutional controls, such as deed restrictions that prevent development of the Site for "Daycare Age Child-type receptors", would not provide protection for the currently allowed uses of the site. In addition, mitigation and monitoring of TCE-impacted soil vapor would provide protection of potential future "Site Workers" by preventing exposure to soil COCs.	There are no risks to current receptors in the SO Area. Institutional controls, such as deed restrictions, that prevent development of the Site for "Daycare Age Child-type receptors", would not provide protection for the currently allowed uses of the site. In addition, excavation of TCE and asbestos contaminated soil would provide protection for potential future "Site Workers" by removing soil COCs from the Site.	There are no risks to current receptors in the SO Area. Establishment of institutional controls, such as a deed restriction, that prohibit residential use of the site, prevent disturbance of the newly installed asphalt or soil cover and require a soil management plan would provide protection to future receptors for the currently allowed uses of the site. TCE and asbestos- contaminated soils would be addressed by excavation. Similarly, surface PAH, lead, and arsenic-contaminated soils would be addressed by excavation to a depth of 1 ft bgs. The resulting excavations would be backfilled, and a new asphalt or soil cover would be constructed over these portions of the Site. Excavation of soil and maintenance of the asphalt or soil cover would provide protection for future receptors as long as the one-foot cover can be designed to meet hazardous waste standards if characteristic hazardous waste is to be left below 1 ft bgs.	There are no risks to current receptors in the SO Area. All contaminants posing a risk under currently allowed uses will be excavated and removed from the Site. Remnant residential risk will be addressed by maintaining the backfilled soil cover over the remaining contaminated soil and instituting a soil management plan. Establishment of institutional controls, such as a deed restriction, that prohibit residential use of the site and require a soil management plan would provide protection to future receptors for the currently allowed uses of the site.
Protection of the Environment	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment.	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment.	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site.	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment.	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment.	Not applicable as there are no "actionable" ecological risks for soils from this portion of the Site and remedial actions will be implemented in a manner that will be protective of the environment.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Chemical-Specific ARARs	This alternative does not address soil contamination; therefore, it does not comply with chemical-specific ARARs.	This alternative will not meet chemical-specific ARARs since risks will remain for the currently allowed uses of the Site.	This alternative will not meet chemical-specific ARARs since risks will remain for the currently allowed uses of the Site. The alternative will meet chemical-specific standards for mitigating risk from TCE contaminated soil vapor by preventing the migration of soil vapor into indoor air.	This alternative will not fully meet chemical-specific ARARs since risks will remain for the currently allowed uses of the Site. The alternative will mitigate risk to a future Site Worker through excavating and removing asbestos and TCE-contaminated soil.	This alternative will meet chemical-specific ARARs by preventing exposure to COCs through removal of all contaminated soil to 1 ft bgs, institutional controls that prevent residential uses and disturbance of newly-installed cover material that would be constructed as part of this alternative. TCE and asbestos-contaminated soils would be addressed by excavation. PAH, lead, and arsenic-contaminated soils would be addressed by excavation to a depth of 1 ft bgs and off-site disposal. The resultant excavations would be backfilled, and a new asphalt or soil cover would be constructed over these portions of the Site. Excavation of soil and maintenance of the asphalt or soil cover, institutional controls, and implementation of a soil management plan would provide protection for future receptors for the currently allowed uses of the Site	This alternative will meet chemical-specific ARARs by excavation and off-site disposal of all contaminants that pose a risk to future receptors for the currently allowed uses of the Site.
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	Remedial activities to be conducted as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12B-2 such as: limiting impacts to wetlands, floodplains, historic features, etc. Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary.	Installation and sampling of soil vapor implants, installation and maintenance of a sub-slab depressurization system and installation of a horizontal barrier would be conducted in a manner to meet location-specific ARARs pertaining to historic preservation, if applicable. Maintenance of the existing asphalt cover over asbestos-impacted soils would be completed in a manner that is compliant with the substantive requirements of the location-specific ARARs identified in Table 12B-3 such as: limiting impacts to features such as: wetlands, floodplains, historic features, etc. Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary	The areas that would be excavated as part of this alternative are potentially near historic features and would be conducted in a manner to meet location-specific ARARs pertaining to historic preservation, if applicable. Work adjacent to other protected features (wetlands and floodplains) would be completed in a manner that is compliant with the substantive requirements of the location-specific ARARs identified in Table 12B-4. Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary.	The areas to be excavated, covered and monitored as part of this alternative are potentially near historic features and adjacent to wetlands and floodplains that are regulated under location-specific ARARS. Therefore, activities contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12B-5. Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary.	The areas to be excavated and monitored as part of this alternative are potentially near historic features and adjacent to wetlands and floodplains that are regulated under location-specific ARARS. Therefore, activities contemplated as part of this alternative would be completed in a manner that is consistent with the substantive requirements of the location-specific ARARs identified in Table 12B-6. Consultation with appropriate regulatory agencies would be completed to address compliance with these ARARs, as necessary.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	Remedial activities implemented as part of this alternative, including long-term monitoring, installation and maintenance of fencing, maintenance of existing soil and asphalt cover, and establishment and monitoring of institutional controls, are subject to the action-specific ARARs identified in Table 12B-2. The current asphalt cover at the site may not meet TSCA standards for asbestos. If characteristic hazardous waste is present, this alternative will not meet federal and state hazardous waste closure/post-closure standards.	Remedial activities implemented as part of this alternative, including long-term monitoring, installation and sampling of soil vapor implants, installation and maintenance of a sub-slab depressurization system, installation of a horizontal barrier, establishment and monitoring of institutional controls, and maintenance of the existing asphalt cover over asbestos-impacted soils, are subject to action-specific ARARs identified in Table 12B-3 The current asphalt cover at the site may not meet TSCA standards for asbestos. If characteristic hazardous waste is present, this alternative will not meet federal and state hazardous waste closure/post-closure standards..	Remedial activities implemented as part of this alternative, including long-term monitoring, establishment of institutional controls, and excavation, are subject to action-specific ARARs identified in Table 12 B-4. If characteristic hazardous waste (from lead or other contaminants) is left in place after the limited excavation, this alternative will not meet federal and state hazardous waste closure/post-closure standards.	Excavation, cover, institutional controls, and monitoring activities implemented as part of this alternative would be completed in a manner that is compliant with the action-specific ARARs identified in Table 12B-5 such as: waste generation, handling, and listing requirements; TSCA requirements for asbestos-impacted soil; groundwater protection standards; air standards; capping guidance, and erosion and sediment control guidance, etc. If characteristic hazardous waste is to be left in place below 1 ft bgs, the alternative can achieve compliance with hazardous waste requirements as long as the one-foot cover can be designed to meet relevant and appropriate standards..	Excavation, institutional controls, and monitoring activities implemented as part of this alternative would be completed in a manner that is compliant with the action-specific ARARs identified in Table 12B-6 such as: waste generation, handling, and listing requirements; TSCA requirements for asbestos-impacted soil; groundwater protection standards; air standards; and erosion and sediment control guidance, etc.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Long-Term Effectiveness and Permanence	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent.	No contamination will be removed or treated as part of this alternative. Remedial measures under this alternative would not be effective for addressing risks for the currently allowed uses of the Site. Contamination would remain on-Site; therefore, five-year reviews would be required.	Only limited contamination will be removed under this alternative from the soil vapor mitigation system. Remaining contamination will still pose a risk for the currently allowed uses of the Site. Potential risks only for a future Site Worker would be mitigated by eliminating exposure to asbestos and TCE-contaminated soil/soil vapor by maintaining a cover over soils, and installing a horizontal barrier / sub-slab depressurization system beneath a hypothetical future building, respectively. Contamination would remain on-Site; therefore, five-year reviews would be required.	Not all contamination will be removed under this alternative from the limited excavation. Remaining contamination will still pose a risk for the currently allowed uses of the Site. Excavating asbestos or TCE-contaminated soils and disposing of these soils off-Site would only mitigate potential risks to a future Site Worker. It is estimated that excavation of these soils could be completed in less than one month from initiation of excavation activities. Contamination would remain on-Site; therefore, five-year reviews would be required.	Establishment of institutional controls, such as deed restrictions that prohibit residential use of the site, prohibit disturbance of the newly installed asphalt or soil cover, and require a soil management plan, would provide protection for the currently allowed uses of the site from contamination that will be left on site below 1 ft bgs.. PAH, lead, and arsenic-contaminated soils would be excavated to a depth of 1 ft bgs; TCE and asbestos-contaminated soils would be excavated to depths of approximately 6 ft bgs, and 4 ft bgs, respectively. Excavations would be backfilled with "clean" fill and covered with an asphalt or vegetated soil cover. It is estimated that these activities could be completed in approximately one to two months from initiation of excavation activities. Contamination would remain on-Site; therefore, five-year reviews would be required.	Establishment of institutional controls, such as a deed restriction, that prohibit residential use of the site and require a soil management plan, would provide protection to future receptors for the currently allowed uses of the site. It is estimated that these activities could be completed in approximately two months from initiation of excavation activities.
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative.	The controls under this alternative are inadequate to address risks posed to the currently allowed uses of the Site.	The controls under this alternative are inadequate to address risks posed to the currently allowed uses of the Site. The horizontal barrier and sub-slab depressurization system, which will address TCE-contaminated soil and soil vapor, consist of generally conventional and well-proven technologies, and are expected to be highly reliable when adequately operated and maintained, particularly when combined with soil vapor and indoor air monitoring.	The controls under this alternative are inadequate to address risks posed to the currently allowed uses of the Site. Excavation and off-Site disposal of TCE and asbestos-contaminated soils is highly reliable and would permanently remove these contaminants from the Site, particularly when combined with confirmatory soil sampling in the excavation areas.	When properly established and implemented, institutional controls provide adequate and reliable measures for a long-term soil remedy, particularly when combined with long-term monitoring and maintenance of the asphalt or soil cover. Excavation and off-Site disposal of PAH, arsenic, lead, TCE, and asbestos-contaminated soils is highly reliable and would permanently remove these contaminants from the Site, particularly when combined with confirmatory soil sampling in the excavation areas.	When properly established and implemented, institutional controls provide adequate and reliable measures for a long-term soil remedy, particularly when combined with long-term monitoring. Excavation and off-Site disposal of PAH, arsenic, lead, TCE and asbestos-contaminated soils is highly reliable and would permanently remove these contaminants from the Site, particularly when combined with confirmatory soil sampling in the excavation areas.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Treatment Process	None	None	Soil vapor extracted by the sub-slab depressurization system would be collected and discharged to the atmosphere.	Soils exceeding characteristic hazardous waste standard (lead) excavated as part of this alternative would be stabilized on-Site to "de-mobilize" hazardous wastes, if necessary. Excavated soil would then be disposed off-Site.	Soils exceeding characteristic hazardous waste standard (lead and arsenic) excavated as part of this alternative would be stabilized on-Site to "de-mobilize" hazardous wastes, if necessary. Excavated soil would then be disposed off-Site.	Soils exceeding characteristic hazardous waste standard (lead and arsenic) excavated as part of this alternative would be stabilized on-Site to "de-mobilize" hazardous wastes, if necessary. Excavated soil would then be disposed off-Site.
Volume Treated	None	None	The sub-slab depressurization system would have a design flow rate of approximately 100 cubic feet per minute of air (equals approximately 5.3×10^8 cubic feet of air over the estimated 10-year operational period of the system). The volume of TCE-contaminated soil that would be treated is approximately 400 cubic yards.	The estimated volume of soil exceeding characteristic hazardous waste standards that would require stabilization is 130 cubic yards.	The estimated volume of soil exceeding characteristic hazardous waste standards that would require stabilization is 2,030 cubic yards.	The estimated volume of soil exceeding characteristic hazardous waste standards that would require stabilization is 2,800 cubic yards.
Reduction of Toxicity, Mobility and/or Volume	None	None	The primary purpose of the sub-slab depressurization system is not to treat soil or soil vapor, but rather to prevent the migration of soil vapor into indoor air of a hypothetical future building. Nonetheless, the TCE soil contamination would be removed with a sub-slab depressurization system in approximately 10 years or less.	The reduction in mobility for excavated soil that would require stabilization would depend on the requirements of the off-site disposal facility and the methods used to stabilize the contaminated soil..	The reduction in mobility for excavated soil that would require stabilization would depend on the requirements of the off-site disposal facility and the methods used to stabilize the contaminated soil..	The reduction in mobility for excavated soil that would require stabilization would depend on the requirements of the off-site disposal facility and the methods used to stabilize the contaminated soil..
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	TCE would be permanently removed from the subsurface. PAH-, arsenic-, lead -, and asbestos-impacted soils would remain in place.	Contaminants within soil which are stabilized and disposed off-Site would be permanently demobilized and removed from the Site. The permanence of treatment would be dependant upon the method of stabilization.	Contaminants within soil which are stabilized and disposed off-Site would be permanently demobilized and removed from the Site. The permanence of treatment would be dependant upon the method of stabilization.	Contaminants within soil which are stabilized and disposed off-Site would be permanently demobilized and removed from the Site. The permanence of treatment would be dependant upon the method of stabilization.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	Assuming an average TCE concentration of 10,000 ug/kg (equivalent to 10 ppm), a total volume of 320 cubic yards of TCE-impacted soil, and a bulk density of 1.5 tons per cubic yard of soil, it is estimated that approximately 10 pounds of TCE are currently located in the subsurface in the ESS Area #1, which would be removed over an estimated 10-year operational period of the sub-slab depressurization system.	It is not expected that soil stabilization will generate any treatment residuals.	It is not expected that soil stabilization will generate any treatment residuals.	It is not expected that soil stabilization will generate any treatment residuals.
Attainment of Statutory Preference for Treatment	No	No	This alternative partially satisfies the statutory preference for treatment as a principal element of the remedial solution by installation and maintenance of a sub-slab depressurization system for TCE contaminated soil. However, asbestos, PAH, lead, and arsenic contaminated soils would not be treated.	This alternative only partially satisfies the statutory preference for treatment for a small quantity of contaminated soil that exceeds hazardous waste standards and that will require stabilization before off-site disposal. Most of the excavated soil will be disposed of off-site untreated. PAH, lead, and arsenic contaminated soil would remain on-Site and not be treated.	This alternative only partially satisfies the statutory preference for treatment since not all of the contaminated soil that will be excavated and disposed of off-site will be stabilized, only the soil that exceeds hazardous waste standards. Soils with PAH, lead, and arsenic contamination below 1 ft bgs would remain on-Site and not be treated.	This alternative only partially satisfies the statutory preference for treatment since not all of the contaminated soil that will be excavated and disposed of off-site will be stabilized, only the soil that exceeds hazardous waste standards. Remnant contamination below cleanup levels, but above levels permitting unrestricted use will be left on-site untreated.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
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Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Community Protection	No additional risks beyond those posed by current conditions.	No additional risks beyond those posed by current conditions.	Institutional controls and maintenance of the current cover would not be protective of the community for the currently allowed uses of the Site. Engineering controls to limit potential fugitive dust and/or vapor emissions associated with construction activities would be implemented, as necessary. Exhaust from operation of the sub-slab depressurization system would be vented above the normal breathing zone.	The limited excavation of some contaminated soils would not be protective of the community for the currently allowed uses of the Site. Engineering controls to limit potential fugitive dust and/or vapor emissions associated with excavation, soil stabilization, and backfilling activities would be implemented, as necessary. In addition, soil transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming trucks capable of carrying 20 tons of soil would be used to transport soil to the off-Site disposal facility, approximately 37 truckloads would be necessary to remove soil and asphalt from the Site. Given that some of the soil would contain asbestos, particular attention to excavating, stabilizing, and transporting soil would be necessary. Asbestos-containing soil would be excavated/stabilized “in the wet” to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community when excavating asbestos-containing soils. In addition, asbestos-containing soil would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet.	Engineering controls to limit potential fugitive dust and/or vapor emissions associated with excavation, soil stabilization, and backfilling activities would be implemented, as necessary. In addition, soil transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming trucks capable of carrying 20 tons of soil would be used to transport soil to the off-Site disposal facility, approximately 273 truckloads would be necessary to remove soil and asphalt from the Site. Given that some of the soil would contain asbestos, particular attention to excavating, stabilizing, and transporting soil would be necessary. Asbestos-containing soil would be excavated/stabilized “in the wet” to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community when excavating asbestos-containing soils. In addition, asbestos-containing soil would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet.	Engineering controls to limit potential fugitive dust and/or vapor emissions associated with excavation, soil stabilization, and backfilling activities would be implemented, as necessary. In addition, soil transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming trucks capable of carrying 20 tons of soil would be used to transport soil to the off-Site disposal facility, approximately 655 truckloads would be necessary to remove soil and asphalt from the Site. Given that some of the soil would contain asbestos, particular attention to excavating, stabilizing, and transporting soil would be necessary. Asbestos-containing soil would be excavated/stabilized “in the wet” to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community when excavating asbestos-containing soils. In addition, asbestos-containing soil would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet.

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Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Short-Term Effectiveness	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Worker Protection	No additional risks beyond those posed by current conditions.	Risks to workers performing installation of soil vapor implants, soil vapor monitoring, long-term monitoring, fence repair, maintenance of the existing cap/cover, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures.	Risks to workers performing long-term monitoring, construction activities, maintenance of the sub-slab depressurization system, soil vapor implant installation, soil vapor and indoor air monitoring, maintenance of the existing cover, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures.	Risks to workers performing excavation, soil stabilization, backfilling, soil sampling, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures. Excavation, stabilization, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing excavation, soil stabilization, backfilling, soil sampling, long-term monitoring, maintenance of asphalt or soil cover, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures. Excavation, stabilization, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing excavation, soil stabilization, backfilling, soil sampling, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures. Excavation, stabilization, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.
Environmental Impacts	Since no actions would be taken under this alternative, no ecological or environmental impacts would be posed by this alternative.	Since no construction would occur under this alternative (i.e., beyond installation/ maintenance of fencing and the cover, along with long-term monitoring), no environmental impacts would be posed by this alternative as long as protective measures are taken, as necessary.	Measures implemented as part of this alternative are not expected to cause adverse environmental impacts, as long as protective measures are taken, as necessary.	Measures implemented as part of this alternative are not expected to cause adverse environmental impacts, as long as protective measures are taken, as necessary.	Measures implemented as part of this alternative are not expected to cause adverse ecological or environmental impacts, as long as protective measures are taken, as necessary.	Measures implemented as part of this alternative are not expected to cause adverse ecological or environmental impacts, as long as protective measures are taken, as necessary.
Time to Achieve RAOs	With no institutional controls or remedial measures implemented, soil COCs would likely remain at concentrations greater than PRGs for greater than 100 years.	This alternative will not fully achieve RAOs. Soil contamination will likely remain greater than PRGs for greater than 100 years. Long-term monitoring, including for soil vapor would provide a means of assessing compliance with RAOs.	This alternative will not fully achieve RAOs. Soil contamination will likely remain greater that PRGs for greater than 100 years. Installation of the horizontal barrier and sub-slab depressurization system on a future building constructed in the vicinity of the ESS Area #1 would achieve RAOs immediately upon start-up of the system. Soil vapor and indoor air monitoring would provide a means of assessing compliance with RAOs.	This alternative will not fully achieve RAOs. Soil contamination will likely remain greater that PRGs for greater than 100 years. RAOs for soil contaminated by TCE and asbestos removed from the site would be achieved in less than one month from initiation of excavation activities. Confirmatory soil sampling would provide a means of assessing compliance with RAOs.	Institutional controls that prevent residential use, establish soil management procedures, and prohibit disturbance of the newly installed asphalt or soil cover (see below) would be immediately effective at achieving PAH, lead, and arsenic soil RAOs upon implementation. PAH, lead, and arsenic-contaminated soils would be excavated to a depth of 1 ft bgs; TCE and asbestos-contaminated soils would be excavated to depths of approximately 6 ft bgs, and 4 ft bgs, respectively. Excavations would be backfilled with “clean” fill and covered with an asphalt or vegetated soil cover. If characteristic hazardous waste is left in place, the cap would need to be designed to meet relevant and appropriate hazardous waste standards to achieve RAOs. It is estimated that these activities could be completed in approximately one to two months from initiation of excavation activities. Confirmatory soil sampling would provide a means of assessing compliance with RAOs.	Institutional controls that prevent residential use and excavation of all contaminated soil that exceeds clean up standards will achieve RAOs. It is estimated that these activities could be completed in approximately two months from initiation of excavation activities. Confirmatory soil sampling would provide a means of assessing compliance with RAOs.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Implementability	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative.	Soil vapor implant installation and maintenance, soil vapor sampling, long-term monitoring, fence installation and maintenance, and asphalt and soil cover maintenance, are standard activities that are routinely implemented.	Soil vapor implant installation and maintenance, soil vapor and indoor air sampling, long-term monitoring, asphalt cover maintenance, and installation and maintenance of a horizontal barrier and sub-slab depressurization system are standard activities that are routinely implemented and/or constructed.	Soil excavation (and soil stabilization) is a standard activity that is routinely implemented.	Soil excavation (and soil stabilization) and installation of an asphalt and soil cover are standard activities that are routinely implemented.	Soil excavation (and soil stabilization) is a standard activity that is routinely implemented.
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative.	Soil vapor implant installation and maintenance, soil vapor sampling, long-term monitoring, fence installation and maintenance, and asphalt and soil cover maintenance can be completed with proven reliable technologies.	Soil vapor implant installation and maintenance, soil vapor and indoor air sampling, long-term monitoring, asphalt cover maintenance, and installation and maintenance of a horizontal barrier and sub-slab depressurization system can be completed with proven reliable technologies.	Soil excavation (and soil stabilization) can be completed with proven reliable technologies.	Soil excavation (and soil stabilization) and installation of the asphalt cap and soil cover can be completed with proven reliable technologies.	Soil excavation (and soil stabilization) can be completed with proven reliable technologies.
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Modifications to the sub-slab depressurization system could be added, if warranted. However, subsequent excavation of soils beneath any future building would be difficult once the building was constructed.	Additional soil excavation activities could be undertaken, if necessary.	Additional soil excavation and cover construction activities could be undertaken, if necessary.	Additional soil excavation activities could be undertaken, if necessary.

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Criteria: Implementability	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Monitorability	No monitoring would be undertaken as part of this alternative other than conducting Five-Year Reviews.	Long-term monitoring will assess whether the remedy is protective. Soil vapor monitoring enables the Site soil vapor (and indirectly, site soil) to be effectively monitored. Quarterly inspections and 5-year reviews would enable the site development and integrity of the asphalt or soil cover to be effectively monitored. Compliance with institutional controls will be evaluated at least yearly.	Long-term monitoring will assess whether the remedy is protective. Soil vapor and indoor air monitoring enable the Site soil vapor and indoor air (and indirectly, site soil) to be effectively monitored. Quarterly inspections and 5-year reviews would enable the site development and integrity of the asphalt cover to be effectively monitored. Compliance with institutional controls will be evaluated at least yearly.	Confirmatory soil samples collected as part of post excavation activities would allow for confirmation of adequate excavation of PAH and asbestos-contaminated soils in the ESS Areas #1 and #2. Quarterly inspections and 5-year reviews would enable the site development to be effectively monitored. Compliance with institutional controls will be evaluated at least yearly.	Confirmatory soil samples collected as part of post excavation activities would allow for confirmation of adequate excavation of soils and characterization of waste left in place below the cover. Quarterly inspections and 5-year reviews would enable the site development and the condition of the asphalt and soil cover to be effectively monitored. Compliance with institutional controls would be evaluated at least yearly.	Confirmatory soil samples collected as part of post excavation activities would allow for confirmation of adequate excavation of soils. Quarterly inspections and 5-year reviews would enable the site development to be effectively monitored. Compliance with institutional controls would be evaluated at least yearly.
Administrative Feasibility	There are no administrative issues with this alternative.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.

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Criteria: Implementability	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative.	Several facilities are currently able to accept the limited quantities of soils that would require off-Site treatment/disposal as part of this alternative (e.g., from long-term monitoring and soil vapor implant installation).	Several facilities are currently able to accept the limited quantities of soils that would require off-Site treatment/ disposal as part of this alternative (e.g., from long-term monitoring, soil vapor implant installation, and construction of the sub-slab depressurization system).	Several facilities are currently able to accept the quantities of TCE-contaminated soil requiring off-Site treatment/ disposal as part of this alternative. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil. Facilities that may accept stabilized lead-contaminated soils may also be limited, but are available in New England.	Several facilities are currently able to accept the quantities of TCE, PAH, and arsenic-contaminated soil requiring off-Site treatment/disposal as part of this alternative. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil. Facilities that may accept stabilized lead-contaminated soils may also be limited, but are available in New England.	Several facilities are currently able to accept the quantities of TCE, PAH, and arsenic-contaminated soil requiring off-Site treatment/disposal as part of this alternative. The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil in Massachusetts is limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil. Facilities that may accept stabilized lead-contaminated soils may also be limited, but are available in New England.
Availability of Personnel, Equipment, and Materials	Personnel, equipment, and materials readily available to conduct Five-Year Reviews.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative.	Technologies implemented as part of this alternative are well established.	Technologies implemented as part of this alternative are well established.	Technologies implemented as part of this alternative are well established.	Technologies implemented as part of this alternative are well established.	Technologies implemented as part of this alternative are well established.

TABLE 14B
Individual Analysis of SO-1 through SO-6 Alternatives
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Criteria: Cost	**Alternatives**					
	Alternative SO-1: No Action	**Alternative SO-2: Limited Action**	**Alternative SO-3: Vapor Intrusion Mitigation and Covering of Soils Containing Asbestos**	**Alternative SO-4: Limited Excavation**	**Alternative SO-5: Excavation of Surface Contaminated Soils with Off-Site Disposal and Covering Remaining Contaminated Soils**	**Alternative SO 6: Comprehensive Excavation and Off-Site Disposal**
Capital Cost	$0	$240,000	$150,000	$220,000	$1,100,000	$2,010,000
Total Annual O&M Cost (7% discount rate)	$0	$630,000	$200,000	$0	$540,000	$0
Total Periodic Costs (7% discount rate)	$32,000	$89,000	$180,000	$32,000	$32,000	$32,000
Total Present Value (7% discount rate)	$32,000	$960,000	$500,000	$250,000	$1,700,000	$2,040,000

1. The costs are generally rounded to two significant figures.

2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e.g., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Criteria: Overall Protection of Human Health and the Environment	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Protection of Human Health	This alternative is not protective of human health because no measures to prevent exposure to contaminated soil in the AOC would be implemented.	This alternative provides protection of human health by establishing institutional controls, long-term monitoring, installing fencing, and maintaining the soil and asphalt covers and the Neponset River culvert to prevent exposure to contaminated soil in the AOC.	This alternative provides protection of human health by establishing institutional controls, long-term monitoring, maintaining the soil and asphalt covers and the Neponset River culvert to prevent exposure to contaminated soil and maintaining fencing. This alternative also provides protection of human health by excavating contaminated soil in the Settling Basin #2 Containment Cell.	This alternative provides protection of human health by establishing institutional controls, long-term monitoring, excavating contaminated soil above the water table in the AOC and Settling Basin #2 Containment Cell, maintaining the newly-installed cover material, and maintaining fencing.
Protection of the Environment	This alternative is not protective of ecological receptors because no measures to prevent exposure to contaminated soil in the AOC would be implemented.	Long-term monitoring and maintenance of the soil and asphalt covers and the Neponset River culvert would provide protection of ecological receptors.	Long-term monitoring and maintenance of the soil and asphalt covers and the Neponset River culvert, and excavation of contaminated soil in the Settling Basin #2 Containment Cell would provide protection of ecological receptors.	Long-term monitoring, excavation of contaminated soils in the AOC and Settling Basin #2 Containment Cell, and maintenance of the cover over remaining contamination would provide protection of ecological receptors. Daylighting the Neponset River through the area will benefit the environment by restoring the former river channel through the site.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Chemical-Specific ARARs	This alternative does not address soil contamination; therefore, it does not comply with chemical-specific ARARs.	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by establishing institutional controls, security/fencing, and maintaining the existing soil and asphalt covers and Neponset River culvert.	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by establishing institutional controls, security/fencing, and maintaining the existing soil and asphalt covers in the soil- and asphalt-covered portions of the AOC. Contaminated soil in the Settling Basin #2 Containment Cell would be excavated and disposed off-Site.	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by establishing institutional controls, long-term monitoring, excavating contaminated soil above the water table in the AOC and Settling Basin #2 Containment Cell and installing a cover over remaining contaminated soils.
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	This alternative will meet location-specific ARARs since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features during monitoring and maintenance-related activities. Measures would be implemented to prevent a release of contaminated media to the surface water bodies or floodplains during maintenance activities, including maintenance of the Neponset River culvert.	This alternative would involve the same monitoring and maintenance-related activities as AOC-2 as well as excavation in the Settling Basin #2 Containment Cell area, which is relatively removed from wetlands, floodplains, surface water bodies, potential historic features, etc. This alternative will meet location-specific ARARs since measures will be implemented that limit potential impacts to wetlands, surface water bodies, floodplains, and potentially historic features. Measures would also be implemented to prevent a release of contaminated media to the surface water bodies or floodplains, particularly during maintenance of the Neponset River culvert.	Given the magnitude of this excavation (approximately 39,000 cubic yards of contaminated soil), removal of the 400-foot long Neponset River culvert, damming and diversion of the Neponset River, and the near proximity of wetland and floodplain environments, some impacts to wetlands, surface water, and floodplains would occur. However, this alternative will meet location-specific ARARs since measures will be implemented to limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features. Measures would also be implemented to prevent a release of contaminated media to the surface water bodies or floodplains.
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	This alternative will meet action-specific ARARs for monitoring, institutional controls, and operation and maintenance of the covers and Neponset River culvert. In addition, measures would be implemented to appropriately handle asbestos-containing media. If the Settling Basin #2 Containment Cell contains characteristic hazardous waste, it will be necessary to assess whether the cell meets relevant and appropriate hazardous waste standards.	This alternative would involve the same monitoring, institutional control, maintenance-related activities as AOC-2 as well as excavation in the Settling Basin #2 Containment Cell area. This alternative will meet action-specific ARARs such as CWA standards associated with discharge of water to a surface water body (if necessary), closure and erosion protection related to maintaining the covers, hazardous waste standards related to generation of hazardous waste, dust control standards related to the CAA, etc., as measures would be implemented to comply with action-specific ARARs. In addition, measures would be implemented to appropriately handle asbestos-containing media.	This alternative will meet action-specific ARARs, including CWA standards associated with discharge of water to a surface water body (during diversion of the Neponset River), closure and erosion protection related to maintaining the cover over areas with remaining contamination (which would be installed after excavation), hazardous waste standards related to generation of hazardous waste, as measures would be implemented to comply with action-specific ARARs. In addition, measures would be implemented to appropriately handle asbestos-containing media and to comply with dust control standards related to the CAA; however, the magnitude of this remedial effort will require careful attention to limit inhalation of fugitive dust containing asbestos by workers and members of the community.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Long-Term Effectiveness and Permanence	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent.	Long-term monitoring, institutional controls including deed restrictions, soil management plan, and installation of fencing provide a means of removing the exposure pathway for current or potential future receptors, and hence eliminating potential risks from contaminated soil in the AOC. It is anticipated that contaminated soil would remain on-Site for greater than 100 years. Contamination would remain on-Site; therefore, five-year reviews would be required.	Long-term monitoring, institutional controls including deed restrictions, soil management plan, and installation of fencing provide a means of removing the exposure pathway for current or potential future receptors and hence eliminating potential risks from contaminated soil in the AOC. Potential risks from contaminated soils in the Settling Basin #2 Containment Cell would be addressed by excavation and off-Site disposal. Contaminated soil in the soil- and asphalt-covered portions of the AOC would remain on-Site for greater than 100 years. It is estimated that soil in the Settling Basin #2 Containment Cell would be excavated in approximately two to four months from initiation of excavation activities. Contamination would remain on-Site; therefore, five-year reviews would be required.	Potential risks from contaminated soils in the AOC and Settling Basin #2 Containment Cell would be addressed by excavation and off-Site disposal. Institutional controls would prohibit excavation of contaminated soils remaining on-Site (i.e., below the water table and under buildings), unless proper precautionary measures were followed. It is estimated that excavation would be completed within approximately six to 12 months of initiation of excavation activities.
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative.	When properly established and implemented, institutional controls, with long-term monitoring and maintenance, provide adequate and reliable measures for a long-term effective soil remedy, particularly when combined with fencing, quarterly inspections, compliance monitoring, and five-year reviews.	When properly established and implemented, institutional controls, with long-term monitoring and maintenance, provide adequate and reliable measures for a long-term effective soil remedy for the AOC, particularly when combined with fencing, quarterly inspections, compliance monitoring, and five-year reviews. Excavation and off-Site disposal of contaminated soil in the Settling Basin #2 Containment Cell is highly reliable and would permanently remove these contaminated soils from the Site.	Excavation and off-Site disposal of contaminated soil from the AOC and Settling Basin #2 Containment Cell is highly reliable and would permanently remove contaminated soils from the Site. When properly established, implemented, and enforced, institutional controls with long-term monitoring provide adequate and reliable measures for a long-term effective soil remedy for addressing contaminated soils remaining on-Site, which would be located below the water table, or under buildings.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Treatment Process	None	None	Contaminated soil excavated as part of this alternative could be stabilized on-Site to "de-mobilize" potentially hazardous wastes, if necessary. Excavated contaminated and stabilized soil would then be disposed off-Site.	Contaminated soil excavated as part of this alternative could be stabilized on-Site to "de-mobilize" potentially hazardous wastes, if necessary. Excavated contaminated and stabilized soil would then be disposed off-Site.
Volume Treated	None	None	Approximately 1,500 cubic yards of contaminated soil would be excavated, stabilized to demobilize characteristic hazardous waste, and disposed off-Site from the Settling Basin #2 Containment Cell.	Approximately 19,000 cubic yards of contaminated soil above characteristic hazardous waste levels, located above the water table would be excavated, stabilized, and disposed off-Site from the AOC. However, contaminated soil located below the water table in the soil-capped portion of the AOC would remain in place.
Reduction of Toxicity, Mobility and/or Volume	None	None	There will be a reduction in toxicity, mobility, and/or volume of only a small volume of waste from the AOC which will be stabilized to demobilize contaminants. Most waste will remain on-site, untreated under the soil and asphalt covers.	The reduction in toxicity, mobility, and/or volume for excavated contaminated soil disposed off-Site would depend upon the volume of soil that requires stabilization.
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	Stabilized contaminated soils excavated as part of this alternative would be permanently demobilized and removed from the Site.	Contaminated soils excavated as part of this alternative would be permanently removed from the Site. The volume of contaminated soil that will be permanently treated is dependent on the amount of characteristic hazardous waste identified..
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	Treatment residuals are not expected from the stabilization process.	Treatment residuals are not expected from the stabilization process.
Attainment of Statutory Preference for Treatment	No	No	The degree to which the stabilization of contaminated soils in the Settling Basin #2 Containment Cell would satisfy the statutory preference for treatment depends on the volume of contaminated soil that contains characteristic hazardous waste. Excavation and disposal of remaining soils from the Settling Basin #2 Containment Cell not requiring stabilization, as well as maintenance of the AOC soil and asphalt cover does not meet the statutory preference for treatment.	The degree to which this alternative would satisfy the statutory preference for treatment depends on the amount of characteristic hazardous waste identified which will require treatment.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of the Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Community Protection	No additional risks beyond those posed by current conditions.	No additional risks beyond those posed by current conditions.	Engineering controls to limit potential fugitive dust associated with excavation, (soil stabilization,) and maintenance of the soil and asphalt cover and Neponset River culvert would be implemented, as necessary. Assuming trucks capable of carrying 20 tons of material are used to transport contaminated soil to the off-Site disposal facility, approximately 110 truckloads would be necessary to remove the contaminated soils in the Settling Basin #2 Containment Cell. Given that the soils in the Settling Basin #2 Containment Cell contain asbestos, particular attention to excavating, (stabilizing) and transporting soils would be necessary. Soil excavation and stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, contaminated soils would need to be transported off-Site in covered roll-off containers or trucks, and soils would likely need to be shipped to the off-Site disposal facility partially wet.	Assuming trucks capable of carrying 20 tons of material are used to transport contaminated soil to the off-Site disposal facility, approximately 3,000 truckloads would be necessary to remove the contaminated soils in the AOC; and an approximately equal number of truckloads of backfill would be required to be brought on-Site. Assuming excavation and backfilling of soils could be completed in 12 months (approximately equivalent to 240 working days), this amounts to approximately 25 truckloads per day of soil transported, on average. The AOC is located on property that is, and has been industrial for hundreds of years; however, the property surrounding the AOC is primarily residential. This is a substantial amount of traffic and asbestos-containing soils to haul through the residential neighborhoods in Walpole. The magnitude of this excavation would require a high degree of care in order to protect members of the community from inhalation of asbestos fibers. While engineering controls and air monitoring (such as those described in the AOC-3 community protection description) to limit potential fugitive dust associated with excavation, soil stabilization, daylighting of the Neponset River, and transport of soil would be implemented, the community could still be affected by the excavation effort due to increased risk from additional traffic, potential failure of engineering controls to limit fugitive dust during excavation, and in particular, transport of soil. Daylighting of the Neponset River would involve rerouting it during the construction in a manner that it would not pose a risk to downstream receptors. Further, a construction effort of this magnitude and duration would pose adverse impacts (noise from construction activities, additional traffic, etc.) during implementation on the quality of life in this area of Walpole, which is primarily residential.
Worker Protection	No additional risks beyond those posed by current conditions.	Risks to workers performing fence installation/repair, soil and asphalt cover repair, maintenance of the Neponset River culvert, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures.	Risks to workers performing long-term monitoring, soil sampling, excavation, (soil stabilization,) transport and disposal of soils, and maintenance of the soil and asphalt covers and Neponset River culvert can be controlled and mitigated with proper health and safety measures. Excavation, (stabilization,) transport, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing soil sampling, excavation, soil stabilization, long-term monitoring, and transport and disposal of soil can be controlled and mitigated with proper health and safety measures. Excavation, stabilization, transport, and disposal of asbestos-impacted soils require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.
Environmental Impacts	Since no actions would be taken under this alternative, no environmental impacts would be posed by this alternative.	It is not expected that maintenance of the fence or soil and asphalt covers would pose significant environmental impacts. Long-term maintenance of the Neponset River culvert will have to be conducted in a manner that will prevent environmental impacts, particularly to downstream receptors.	Measures that would be implemented as part of this alternative as part of long-term monitoring and maintaining the asphalt and soil covers are not expected to engender adverse environmental impacts. Long-term maintenance of the Neponset River culvert will have to be conducted in a manner that will prevent environmental impacts, particularly to downstream receptors.	Given the large volume of soils to be removed (approximately 39,000 cubic yards), the fact that the Neponset River would be temporarily re-routed, and the 400-ft long aluminum culvert through which the River currently flows would be removed, the aquatic environment would be disturbed/impacted in the short-term. However, the river bank and bottom would be re-established after removal of the AOC contaminated soils and aluminum culvert.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of the Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Time to Achieve RAOs	With no institutional controls or other remedial measures implemented, contaminated soil RAOs would not be achieved.	Institutional controls, maintenance of fencing, and maintenance of the soil and asphalt covers, long-term monitoring, and maintenance of the Neponset River culvert would achieve RAOs immediately upon implementation of these measures. Quarterly inspections, compliance monitoring, and five-year reviews would provide a means of assessing compliance with RAOs.	Institutional controls, maintenance of fencing, and maintenance of the soil and asphalt covers, long-term monitoring, and maintenance of the Neponset River culvert would achieve RAOs immediately upon implementation of these measures. Quarterly inspections, compliance monitoring, and five-year reviews would provide a means of assessing compliance with RAOs. Excavation of contaminated soil in the Settling Basin #2 Containment Cell will delay attainment of RAOs by approximately two to four months after initiation of construction activities.	Excavation of contaminated soil above the water table in the AOC, installation and maintenance of a soil cover over remaining contamination, institution of a soil management plan for contamination under buildings, and establishment of institutional controls would achieve RAOs within six to 12 months of initiation of construction activities.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative.	Fence repair and maintenance of the soil and asphalt covers are standard activities that are routinely implemented. Maintenance of the Neponset River culvert will be more difficult since repair may require rerouting of the river and potential disturbance of covered contaminated soil.	Fence repair, maintenance of the soil and asphalt covers, soil excavation, (and soil stabilization) are standard activities that are routinely implemented. Maintenance of the Neponset River culvert will be more difficult since repair may require rerouting of the river and potential disturbance of covered contaminated soil.	Soil excavation and soil stabilization are standard activities that are routinely implemented. However, the magnitude of this remedial alternative (e.g., excavation of approximately 39,000 cubic yards of contaminated soil, removal of 400-feet of aluminum culvert, diversion of the Neponset River, etc.) would pose challenges to completing this alternative in a timely manner. Rerouting of the Neponset River during the work may also provide difficulties. Coordination of a construction effort of this magnitude is considerable.
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative.	Fence repair and maintenance of the soil and asphalt covers can be completed with proven reliable technologies. Technologies to maintain the culvert are available but may be more difficult to implement.	Fence repair, maintenance of the soil and asphalt covers, soil excavation, and soil stabilization can be completed with proven reliable technologies. Technologies to maintain the culvert are available but may be more difficult to implement.	Excavation and soil stabilization can be completed with proven reliable technologies. Technologies to reroute the Neponset River are available but may be difficult to implement.
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Additional actions could be undertaken. However, after the river and river bank are restored and the excavations are backfilled, deeper excavations would require substantial effort.
Monitorability	No monitoring would be undertaken as part of this alternative other than conducting Five-Year Reviews.	The integrity of the fence, Neponset River culvert, and the soil and asphalt cover would be assessed during quarterly inspections and five-year reviews; and actions taken as needed to maintain these controls. There would be yearly monitoring of compliance with institutional controls.	Construction observation would allow for confirmation of adequate excavation of contaminated soils from the Settling Basin #2 Containment Cell. The integrity of the fence and the soil and asphalt cover would be assessed during quarterly inspections and five-year reviews; and actions taken as needed to maintain these controls. There would be yearly monitoring of compliance with institutional controls.	Construction observation would allow for assessment of adequate excavation of contaminated soils. The integrity of the fence and cover would be assessed during quarterly inspections, long-term monitoring, and five-year reviews; and actions taken as needed to maintain these controls. There would be yearly monitoring of compliance with institutional controls.
Administrative Feasibility	There are no administrative issues with this alternative, other than conducting Five-Year Reviews.	Establishment and enforcement of institutional controls and continued access to Site require the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment and enforcement of institutional controls and continued access to Site require the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Given the magnitude of this remedial alternative (e.g., excavation of approximately 39,000 cubic yards of contaminated soil, removal of 400 feet of aluminum culvert, etc.) the administrative feasibility of implementing this alternative would be substantial. Implementation of AOC-4 would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas of the Site, and property access to affected properties. Cooperation with surrounding property owners and local health authorities would be necessary to protect members of the community from inhalation of asbestos fibers. In addition, on-going traffic control would be necessary given the amount of construction-related traffic at the Site. Establishment and enforcement of institutional controls and continued access to Site require the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative.	No treatment would occur as part of this alternative. There may be some potential disposal of waste generated by monitoring or operation and maintenance.	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soils in Massachusetts is limited. However, there are currently treatment/disposal facilities in the greater New England area that can accept this volume of asbestos-containing soils. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England.	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soils in Massachusetts is limited, particularly considering the volume of soils (approximately 39,000 cubic yards) that would be excavated under the AOC-4 alternative. However, there are currently treatment/disposal facilities in the greater New England area that can accept this volume of asbestos-containing soils. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
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Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Availability of Personnel, Equipment, and Materials	Personnel, equipment, and materials readily available to conduct Five-Year Reviews.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.	The magnitude of this remedial alternative would require substantial coordination to provide adequately trained personnel and appropriate equipment and materials for implementation.
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative.	Technologies that would be implemented as part of this alternative are well established.	Technologies that would be implemented as part of this alternative are well established.	Technologies that would be implemented as part of this alternative are well established.

TABLE 14C
Individual Analysis of AOC-1 through AOC-4 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Alternatives**			
	Alternative AOC-1: No Action	**Alternative AOC-2: Limited Action**	**Alternative AOC-3: Maintain Existing Soil and Asphalt Covers on AOC, Excavate Settling Basin #2 Containment Cell, Off-Site Disposal, Institutional Controls**	**Alternative AOC-4: Excavation of AOC/Settling Basin #2 Containment Cell, Removal of Neponset River Culvert, Off-Site Disposal, Institutional Controls**
Capital Cost	$0	$15,000	$500,000	$12,000,000
Total Annual O&M Cost (7% discount rate)	$0	$330,000	$330,000	$330,000
Total Periodic Costs (7% discount rate)	$32,000	$67,000	$67,000	$67,000
Total Present Value (7% discount rate)	$32,000	$412,000	$900,000	$12,000,000

1. The costs are generally rounded to two significant figures.
2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.
3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e.g., routine operation, maintenance, and monitoring)..
4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).
5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.
6. Refer to the text and appendices of this report for additional information regarding costs.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Overall Protection of Human Health and the Environment	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Protection of Human Health	This alternative is not protective of human health because no measures to prevent exposure to soil and sediment that has contaminant levels exceeding human health risk standards would be implemented.	This alternative does not provide protection of human health since establishing institutional controls and fencing is not sufficient to prevent exposure to contaminated sediment and soil.	This alternative does not fully provide protection of human health. Excavation of contaminated soils and sediments in the Former Mill Tailrace and along the Neponset River will be protective. However, the aqueous cap on Lewis Pond may not provide protection from exposure to asbestos-contaminated sediments and will not be protective against the release of hazardous waste that may be in the pond sediments..	This alternative provides protection of human health. Excavation of contaminated soils and sediments in the Former Mill Tailrace and along the Neponset River will remove all contamination that poses a risk. Capping of Lewis Pond sediment will be protective as long as an engineered cap can prevent the release of asbestos, as well as any hazardous waste present.	This alternative provides protection of human health by excavating and disposing off-site all contaminated soils/sediments that pose a risk to human health.
Protection of the Environment	Not applicable as there are no “actionable” ecological risks for soils or sediment from this portion of the Site.	Not applicable as there are no “actionable” ecological risks for soils or sediment from this portion of the Site.	Not applicable as there are no “actionable” ecological risks for soils or sediment from this portion of the Site.	Not applicable as there are no “actionable” ecological risks for soils or sediment from this portion of the Site.	Not applicable as there are no “actionable” ecological risks for soils or sediment from this portion of the Site.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Compliance with ARARs	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Chemical-Specific ARARs	This alternative does not address soil/sediment contamination risks; therefore, it does not comply with chemical-specific ARARs.	This alternative will not meet the chemical-specific ARARs since potential risks/hazards would not be addressed by establishing institutional controls and installing fencing to preclude access to soil/sediment with COC concentrations greater than PRGs, particularly in an active residential setting .	This alternative will meet the chemical-specific ARARs in excavation areas in the Former Mill Tailrace and along the Neponset River. However, chemical-specific standards will not be addressed by only establishing institutional controls and maintaining the water levels in Lewis Pond.	This alternative will meet the chemical-specific ARARs in excavation areas in the Former Mill Tailrace and along the Neponset River. Chemical-specific standards will also be met in Lewis Pond as long as the engineered cap can be constructed and maintained in a manner that will prevent release of contamination.	This alternative will meet the chemical-specific ARARs since potential risks/hazards would be addressed by excavating/dredging soil/sediment exceeding these standards.
Location-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	Given that the active remedial activities for this alternative are installation and maintenance of fencing and long-term monitoring, this alternative will meet location-specific ARARs that restrict impacts to wetlands, surface water bodies, floodplains, and potentially historic features (e.g., potentially the West Street Dam and Former Mill Tailrace). This alternative does not include any measures that prevent a release of contaminated media to surface water bodies or floodplains.	This alternative will meet location-specific ARARs for remedial actions in the Former Mill Tailrace and along the Neponset River since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features. In Lewis Pond, maintenance of the aqueous cap through operation of the pond's dam would be conducted in a manner to meet all location-specific standards, however, if hazardous waste is present in Lewis Pond sediments, relevant and appropriated hazardous waste standards would not be met.	This alternative will meet location-specific ARARs since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features (e.g., potentially the West Street Dam) due to excavation/dredging activities. Measures would also be implemented to prevent a release of contaminated media to the surface water bodies or floodplains. The engineered cap over the Lewis Pond sediments will meet these standards only if it can be constructed and maintained in a manner that will prevent release of contamination and that will mitigate for lost flood storage capacity from Lewis Pond, so as to not pose a threat to downstream resources.	This alternative will meet location-specific ARARs since measures will be implemented that limit impacts to wetlands, surface water bodies, floodplains, and potentially historic features (e.g., potentially the West Street Dam) due to excavation and/or dredging activities. Measures would be implemented to prevent a release of contaminated media to the surface water bodies or floodplains.
Action-Specific ARARs	Not applicable as no remedial measures would be performed under this alternative.	Since this alternative leaves asbestos and hazardous wasted in place without controls, it will not meet action-specific ARARs associated with hazardous waste standards, dust control standards related to the CAA, or asbestos-containing media handling standards.	Action-specific ARARs will be met during the excavation of contaminated soils/sediments in the Mill Tailrace and along the Neponset River, including measures to protect water quality and properly handle hazardous waste and asbestos. If hazardous waste is present in Lewis Pond sediments, this alternative will not meet relevant and appropriate hazardous waste standards.	Action-specific ARARs will be met during the excavation of contaminated soils/sediments in the Former Mill Tailrace and along the Neponset River, including measures to protect water quality and properly handle hazardous waste and asbestos. If hazardous waste is present in Lewis Pond sediments, this alternative would be implemented and maintained to ensure the engineered cap complies with the relevant and appropriate portions of RCRA post closure standards. In addition, measures would be implemented to appropriately manage and handle asbestos-containing media.	Action-specific ARARs will be met during the excavation of contaminated soils/sediments, including measures to protect water quality and properly handle hazardous waste and asbestos.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Long-Term Effectiveness and Permanence	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Magnitude of Residual Risk	There would be no risk reduction from baseline conditions under this alternative. Therefore, this alternative is neither effective, nor permanent.	Institutional controls including deed restrictions, and installation of fencing provide only limited means of removing the exposure pathway for current or potential future receptors, and hence eliminating potential risks from lead in soil on Lot #33-257 (active residential), and from asbestos and potentially hazardous waste impacted soils and sediment in the remainder of this remedial area. It is anticipated that lead-impacted soils on Lot 33-257 and asbestos and hazardous waste-impacted soils and sediments on the rest of this portion of the Site would remain on-Site for greater than 100 years. Contamination would remain in place on-Site; therefore, five-year reviews would be required.	No residual risk will remain in the Former Mill Tailrace and along the Neponset River after excavation/dredging. Excavated or dredged soils/sediment would be disposed off-Site. Asbestos-impacted and potentially hazardous waste contaminated sediments would remain in Lewis Pond. .Pre-design studies would be necessary to assess if the aqueous cap and institutional controls are adequate to prevent asbestos fibers from becoming airborne and to identify whether elevated sediment contamination exceeds characteristic hazardous waste standards. It is estimated that soils/sediments would be excavated/dredged and modifications to the West Street Dam would be completed within approximately three to four months of initiation of excavation/dredging and dam reconstruction activities. Asbestos and potential hazardous waste contaminated sediments would remain on-Site at Lewis Pond; therefore, five-year reviews would be required.	No residual risk will remain in the Former Mill Tailrace and along the Neponset River after excavation/dredging. Excavated or dredged soils/sediment would be disposed off-Site. Asbestos-impacted and potentially hazardous waste contaminated sediments would remain in Lewis Pond and would be addressed by installing an engineered cap (e.g., concrete revetment with vegetated soil/sediment cover) over these sediments to preclude inhalation of asbestos fibers or contact with hazardous waste present in sediment. Institutional controls and long-term monitoring would help ensure the cap remains protective. It is estimated that soils/sediments would be excavated/dredged and construction of the cap would be completed within approximately two to four months from initiation of excavation/dredging and cap construction activities. Contaminated sediments would remain on-Site at Lewis Pond; therefore, five-year reviews would be required.	Potential risks to a current or future resident from contaminated soils/sediments would be addressed by excavation. Excavated or dredged soils/sediment would be disposed off-Site. It is estimated that soil/sediment excavation/dredging would be completed within approximately two to four months of initiation of excavation activities.
Adequacy and Reliability of Controls	No controls would be implemented as part of this alternative.	Institutional controls can be difficult to implement on residential properties, so are not adequate to ensure the protectiveness of the remedy in this area.	Excavation and off-Site disposal of soil and sediment from the Neponset River Lot 33-257 and Lot 33-360, and the Former Mill Tailrace is highly reliable, particularly when combined with confirmatory soil/sediment sampling in the excavated/dredged areas, and would permanently remove COCs from the Site. The adequacy of preventing inhalation of asbestos fibers present in Lewis Pond sediment by keeping these sediments wet and/or covered with water would need to be further evaluated as a pre-design measure. Similarly, the reliability of the water level controls provided by the West Street Dam (whether automated or manual) would also need to be further evaluated as a pre-design measure. The presence of contaminant levels exceeding hazardous waste standards in Lewis Pond sediments would also need to be assessed.	Excavation and off-Site disposal of soil and sediment from the Neponset River Lot 33-257and Lot 33-360, and the Former Mill Tailrace is highly reliable, particularly when combined with confirmatory soil/sediment sampling in the excavated/dredged areas, and would permanently remove COCs from the Site. Capping of asbestos-impacted sediments with concrete revetments with vegetated soil/sediment cover is a highly reliable means of preventing inhalation of asbestos fibers and exposure to potential hazardous waste from Lewis Pond sediments, particularly when combined with routine inspections, long-term monitoring, institutional controls, and as necessary, maintenance of the capped areas.	Excavation/dredging and off-Site disposal of lead- and asbestos-contaminated soil/sediment is highly reliable, particularly when combined with confirmatory soil/sediment sampling in the excavated/dredged areas, and would permanently remove COCs from the Site.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Reduction of Toxicity, Mobility and/or Volume through Treatment	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Treatment Process	None	None	Soil/sediment excavated/dredged as part of this alternative could be stabilized on-Site to "de-mobilize" characteristic hazardous wastes, if necessary. Excavated soil/sediment would then be disposed off-Site.	Soil/sediment excavated/dredged as part of this alternative could be stabilized on-Site to "de-mobilize" characteristic hazardous wastes, if necessary. Excavated soil/sediment would then be disposed off-Site.	Soil/sediment excavated/dredged as part of this alternative could be stabilized on-Site to "de-mobilize" characteristic hazardous wastes, if necessary. Excavated soil/sediment would then be disposed off-Site.
Volume Treated	None	None	Approximately 800 cubic yards of soil from Lot 33-257 and Lot 33-360 (1,200 tons) and 50 cubic yards (90 tons) of sediment from the Former Mill Tailrace would be excavated/dredged, stabilized, and disposed off-Site.	Approximately 800 cubic yards of soil from Lot 33-257 and Lot 33-360 (1,200 tons) and 50 cubic yards (90 tons) of sediment from the Former Mill Tailrace would be excavated/dredged, stabilized, and disposed off-Site.	Approximately 800 cubic yards of soil from Lot 33-257 and Lot 33-360 (1,200 tons), 50 cubic yards (90 tons) of sediment from the Former Mill Tailrace, and 3,600 cubic yards (6,300 tons) from Lewis Pond would be excavated/dredged, stabilized, and disposed off-Site.
Reduction of Toxicity, Mobility and/or Volume through Treatment	None	None	The reduction in toxicity, mobility, and/or volume for excavated/dredged soil/sediment would depend upon how much characteristic hazardous waste was identified requiring stabilization prior to off-site disposal. There would be no treatment of contaminated sediment in Lewis Pond.	The reduction in toxicity, mobility, and/or volume for excavated/dredged soil/sediment disposed off-Site would depend upon how much characteristic hazardous waste was identified requiring stabilization prior to off-site disposal. There would be no treatment of contaminated sediment in Lewis Pond.	The reduction in toxicity, mobility, and/or volume for excavated/dredged soil/sediment disposed off-Site would depend upon how much characteristic hazardous waste was identified requiring stabilization prior to off-site disposal..
Permanence of Treatment	Not applicable as there is no treatment	Not applicable as there is no treatment	The stabilization of soil/sediment from the Former Mill Tailrace and the Neponset River would permanently demobilize characteristic hazardous wastes prior to off-site disposal. Remaining contaminated soils and sediments would not be treated.	The stabilization of soil/sediment from the Former Mill Tailrace and the Neponset River would permanently demobilize characteristic hazardous wastes prior to off-site disposal. Remaining contaminated soils and sediments would not be treated.	The stabilization of soil/sediment would permanently demobilize characteristic hazardous wastes prior to off-site disposal. Remaining contaminated soils and sediments removed from the Site would not be treated.
Type and Quantity of Treatment Residuals	Not applicable as there is no treatment	Not applicable as there is no treatment	No residuals are expected from the stabilization process.	No residuals are expected from the stabilization process.	No residuals are expected from the stabilization process.
Attainment of Statutory Preference for Treatment	No	No	The degree to which the excavation/dredging with off-Site disposal portion of this alternative would satisfy the statutory preference for treatment depends on the volume of contaminated soil/sediment stabilized. Soils/sediments not stabilized prior to off-site disposal and contaminated sediments left in place under an aqueous cap over Lewis Pond would not satisfy the statutory preference for treatment.	The degree to which the excavation/dredging with off-Site disposal portion of this alternative would satisfy the statutory preference for treatment depends on the volume of contaminated soil/sediment stabilized.. Soils/sediments not stabilized prior to off-site disposal and contaminated sediments left in place under a cap in Lewis Pond would not satisfy the statutory preference for treatment.	The degree to which this alternative would satisfy the statutory preference for treatment, depends on the volume of contaminated soil/sediment stabilized. . Soils/sediments not stabilized prior to off-site disposal would not satisfy the statutory preference for treatment.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Community Protection	No additional risks beyond those posed by current conditions.	No additional risks beyond those posed by current conditions.	Engineering controls to limit potential fugitive dust associated with soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, dam maintenance or construction activities, and backfilling/wetland mitigation activities would be implemented, as necessary. In addition, soil/sediment transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming 20 tons per truckload to transport soil/sediment to the off-Site disposal facility, approximately 65 truckloads would be necessary to remove soil/sediment from Lot 33-257, Lot 33-360, and the Former Mill Tailrace. Given that these soils/sediments would contain asbestos, particular attention to excavating, dredging, stabilizing, and transporting soil/sediment would be necessary. Soil/sediment excavation/dredging/ stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, soil/sediment would likely need to be shipped to the off-Site disposal facility partially wet.	Engineering controls to limit potential fugitive dust associated with soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, construction of the cap, and backfilling/wetland mitigation activities would be implemented, as necessary. In addition, soils/sediment transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming 20 tons per truckload to transport soil/sediment to the off-Site disposal facility, approximately 65 truckloads would be necessary to remove soil/sediment from Lot 33-257, Lot 33-360, and the Former Mill Tailrace. Given that these soils/sediments would contain asbestos, particular attention to excavating, dredging, stabilizing, and transporting soil/sediment would be necessary. Soil/sediment excavation/dredging/ stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, soil/sediment would likely need to be shipped to the off-Site disposal facility partially wet.	Engineering controls to limit potential fugitive dust associated with soil/sediment excavation/dredging, soil/sediment stabilization, and backfilling/wetland mitigation activities would be implemented, as necessary. In addition, soils/sediment transported off-Site for disposal would be contained in covered roll-off containers or trucks. Assuming 20 tons per truckload to transport soil/sediment to the off-Site disposal facility, approximately 380 truckloads would be necessary to remove soil/sediment from the Site. Given that these soils/sediments would contain asbestos, particular attention to excavating, dredging, stabilizing, and transporting soil/sediment would be necessary. Soil/sediment excavation/dredging/stabilization would need to be done "in the wet" to limit potential inhalation of asbestos fibers by the community during construction activities. Air monitoring would need to be performed to assess potential inhalation risks to the community. In addition, soil/sediment would likely need to be shipped to the off-Site disposal facility partially wet.
Worker Protection	No additional risks beyond those posed by current conditions.	Risks to workers performing fence installation/repair, long-term monitoring, quarterly inspections, and five-year reviews can be controlled and mitigated with proper health and safety measures.	Risks to workers performing soil/sediment excavation/dredging, soil/sediment stabilization, backfilling/wetlands mitigation, long-term monitoring and construction/maintenance of the West Street Dam can be controlled and mitigated with proper health and safety measures. Excavation/dredging, stabilization, transport, and disposal of asbestos-impacted soils/sediments require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, backfilling/ wetlands mitigation, and construction/maintenance of the cap can be controlled and mitigated with proper health and safety measures. Excavation/dredging, stabilization, transport, and disposal of asbestos-impacted soils/sediments require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.	Risks to workers performing soil/sediment excavation/dredging, soil/sediment stabilization, and backfilling/wetlands mitigation can be controlled and mitigated with proper health and safety measures. Excavation/dredging, stabilization, transport, and disposal of asbestos-impacted soils/sediments require particular attention to health and safety measures in order to prevent inhalation of asbestos fibers.
Environmental Impacts	Since no actions would be taken under this alternative, no environmental impacts would be posed by this alternative.	Long-term monitoring and installation/maintenance of fencing would not pose significant environmental impacts.	Approximately 1,200 square feet of wetland in the Former Mill Tailrace would be disturbed or destroyed as part of the excavation/dredging activities in this area of the site. However, these wetlands would be mitigated/restored as part of this alternative. Since the water level that would be maintained in Lewis Pond is generally consistent with typical water levels currently in Lewis Pond, no significant environmental impacts would be posed by maintaining the water level in Lewis Pond at an elevation of 140 ft AMSL. Construction, excavation, and dredging activities contemplated as part of this alternative could cause re-suspension of contaminated sediments. Therefore, silt curtains will be used to contain and control migration of re-suspended sediment. There would be potential environmental impacts if sediments exceeding hazardous waste standards are left in place in Lewis Pond.	Approximately 47,600square feet of wetland in the Former Mill Tailrace and Lewis Pond would be disturbed or destroyed as part of the excavation/dredging /capping activities in this area of the site. However, these wetlands would be mitigated/restored as part of this alternative. The concrete cap would be installed with a soil/sediment cover and re-vegetated; however, potential environmental impacts would need to be further evaluated as part of pre-design investigations. Construction, excavation, and dredging activities contemplated as part of this alternative could cause re-suspension of contaminated sediments. Therefore, silt curtains will be used to contain and control migration of re-suspended sediment.	Approximately 47,600 square feet of wetland in the Former Mill Tailrace and Lewis Pond would be disturbed or destroyed as part of the excavation/dredging activities in this area of the site. However, these wetlands would be mitigated/restored as part of this alternative. Construction, excavation, and dredging activities contemplated as part of this alternative could cause re-suspension of contaminated sediments. Therefore, silt curtains will be used to contain and control migration of re-suspended sediment.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Short-Term Effectiveness	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Time to Achieve RAOs	With no institutional controls or active remedial measures implemented, soil/sediment RAOs would not be achieved.	Institutional controls and installation of fencing would not achieve soil/sediment RAOs since site risks would not be adequately addressed. Quarterly inspections, long-term monitoring, and five-year reviews would provide a means of assessing compliance with RAOs.	RAOs for soil/sediment on Lot 33-257, Lot 33-360, and the Former Mill Tailrace would be achieved within approximately one month of initiation of excavation/dredging activities; establishment and maintenance of the newly reconstructed wetlands would be on-going after this. Maintenance of water levels in Lewis Pond would achieve sediment RAOs in Lewis Pond within approximately three to four months of initiation of construction activities associated with modifying the West Street Dam, as long as no characteristic hazardous wastes are present in Lewis Pond sediments. Quarterly inspections, compliance monitoring of institutional controls, five-year reviews, long-term monitoring, and maintenance of the West Street Dam would provide a means of assessing continued compliance with RAOs.	RAOs for soil/sediment on Lot 33-257, Lot 33-360, and the Former Mill Tailrace would be achieved within approximately one month of initiation of excavation/dredging activities; establishment and maintenance of the newly reconstructed wetlands would be on-going after this. RAOs for Lewis Pond sediment would be achieved within approximately two to four months of initiation of construction activities associated with installing the capping material; establishment and maintenance of the newly reconstructed wetlands would be on-going after this. Quarterly inspections, long-term monitoring, compliance monitoring of institutional controls, five-year reviews, and maintenance of the cap would provide a means of assessing continued compliance with RAOs.	RAOs for soil/sediment would be achieved within approximately two to four months of initiation of excavation/dredging activities; establishment and maintenance of the newly reconstructed wetlands would be on-going for a period of 1 to 2 years after this.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Ability to Construct and Operate Technology	Not applicable as no construction or operation of equipment would be implemented as part of this alternative.	Long-term monitoring and fence installation and repair is a standard activity that is routinely implemented.	Long-term monitoring, soil/sediment excavation/dredging, soil/sediment stabilization, and dam construction/modification/maintenance are standard activities that are routinely implemented and/or constructed. The ability to adequately operate the West Street Dam in a manner that reliably maintains water levels in Lewis Pond would be further evaluated as a pre-design measure.	Soil/sediment excavation/dredging, soil/sediment stabilization, long-term monitoring, and installation of capping materials are standard activities that are routinely implemented and/or constructed.	Soil/sediment excavation/dredging and soil/sediment stabilization are standard activities that are routinely implemented and/or constructed.
Reliability of Technology	Not applicable as no technologies would be implemented as part of this alternative.	Long-term monitoring and fence installation and maintenance can be completed with proven reliable technologies.	Long-term monitoring, soil/sediment excavation/dredging, (soil/sediment stabilization,) and dam construction/ modification/maintenance can be completed with proven reliable technologies. The reliability of maintenance of the Lewis Pond water level at precluding air-borne transport and potential inhalation of asbestos fibers from Lewis Pond sediment would be further evaluated as a pre-design measure.	Soil/sediment excavation/dredging, long-term monitoring, soil/sediment stabilization, and installation of capping materials can be completed with proven reliable technologies.	Soil/sediment excavation/dredging and soil/sediment stabilization can be completed with proven reliable technologies.
Ease of Undertaking Additional Remedial Actions, if Necessary	Additional actions could be readily undertaken.	Additional actions could be readily undertaken.	Additional actions could be readily undertaken, if necessary.	Subsequent excavation of soils beneath the engineered cap would be difficult once the cap was constructed	Additional actions could be readily undertaken, if necessary.
Monitorability	No monitoring would be undertaken as part of this alternative, except for conducting Five-Year Reviews.	Long-term monitoring, quarterly inspections and five-year reviews would ensure that the integrity of the fence be maintained. There would be yearly monitoring of compliance with institutional controls.	Confirmatory soil/sediment samples collected as part of post excavation activities would allow for confirmation of adequate excavation/ dredging of soils/sediment. Periodic dam inspections, quarterly inspections, long-term monitoring, and five-year reviews would enable the adequacy of the aqueous cap to be effectively monitored. There would be yearly monitoring of compliance with institutional controls.	Confirmatory soil/sediment samples collected as part of post excavation activities would allow for confirmation of adequate excavation/dredging of soils/sediment. Quarterly inspections, long-term monitoring, and five-year reviews would enable the adequacy of the cap to be effectively monitored. There would be yearly monitoring of compliance with institutional controls.	Confirmatory soil/sediment samples collected as part of post excavation activities would allow for confirmation of adequate excavation/dredging of soils/sediment.
Administrative Feasibility	There are no administrative issues with this alternative.	Establishment of institutional controls and continued access to Site requires the cooperation of affected property owners. Deed restrictions and some types of institutional controls, such as local zoning, may require regulatory enforcement.	Establishment of institutional controls and access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement. Work in and around the Neponset River and wetlands and management of water levels on Lewis Pond would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas both on and downstream of the Site.	Establishment of institutional controls and access to Site requires the cooperation of affected property owners. Deed restrictions, and some types of institutional controls, such as local zoning, may require regulatory enforcement. Work in and around the Neponset River and wetlands would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas of the Site. Coordination with management agencies may also be required if management of the Lewis Pond dam is required to construct or maintain the engineered cap.	Work in and around the Neponset River and wetlands would require coordination with regulatory agencies to address potential impacts to the Neponset River and/or wetland areas of the Site, and would also require property access to affected properties. Coordination with management agencies may also be required if management of the Lewis Pond dam is required to implement the sediment removal.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Implementability	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Availability / Capacity of Treatment / Disposal Facilities	Not applicable, as no treatment or disposal would occur as part of this alternative.	Several facilities are currently able to accept the relatively minor volume of soil/sediment potentially generated as part of monitoring, fence installation and/or maintenance	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England.	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England.	The availability of potential off-Site treatment and/or disposal facilities for asbestos-containing soil/sediment in Massachusetts is somewhat limited. However, there are currently treatment/disposal facilities in the greater New England area that will accept asbestos-containing soil/sediment. Facilities authorized to accept stabilized hazardous waste may also be somewhat limited around New England.
Availability of Personnel, Equipment, and Materials	Personnel, equipment, or materials would be available to conduct Five-Year Reviews..	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.	Personnel, equipment, and materials are generally available for implementation of this alternative.
Availability of Technology	Not applicable, as no technologies would be implemented as part of this alternative.	Technologies that would be implemented as part of this alternative are well established.	Technologies that would be implemented as part of this alternative are well established.	Technologies that would be implemented as part of this alternative are well established.	Technologies that would be implemented as part of this alternative are well established.

TABLE 14D
Individual Analysis of SSW-1 through SSW-5 Alternatives
Feasibility Study
Blackburn & Union Privileges Superfund Site
Walpole, Massachusetts

Criteria: Cost	**Alternatives**				
	Alternative SSW-1: No Action	**Alternative SSW-2: Limited Action**	**Alternative SSW-3: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Maintain Aqueous Cap on Lewis Pond Sediment**	**Alternative SSW-4: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, and the Former Mill Tailrace; Subaqueous Capping of Lewis Pond Sediment**	**Alternative SSW-5: Excavation/Dredging of Soil and Sediment on Neponset River Lot 33-257, Neponset River Lot 33-360, the Former Mill Tailrace, and Lewis Pond**
Capital Cost	$0	$310,000	$1,000,000	$1,400,000	$3,100,000
Total Annual O&M Cost (7% discount rate)	$0	$190,000	$230,000	$110,000	$0
Total Periodic Costs (7% discount rate)	$32,000	$82,000	$43,000	$46,000	$14,000
Total Present Value (7% discount rate)	$32,000	$580,000	$1,300,000	$1,600,000	$3,100,000

1. The costs are generally rounded to two significant figures.

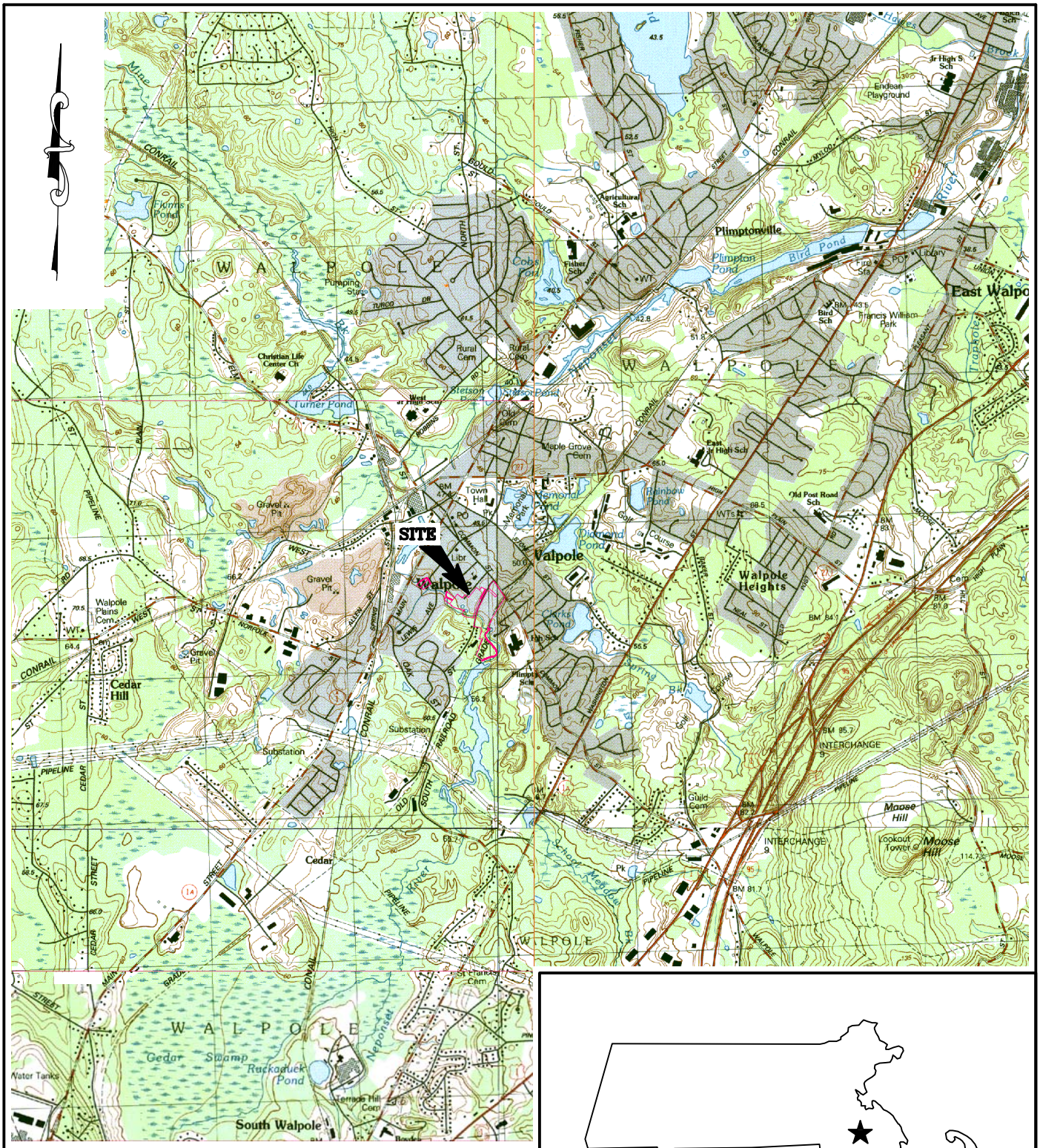
2. "Capital Cost" refers to costs associated with alternative design, construction, installation, and start-up. All capital costs are assumed to occur in year zero for cost discounting purposes.

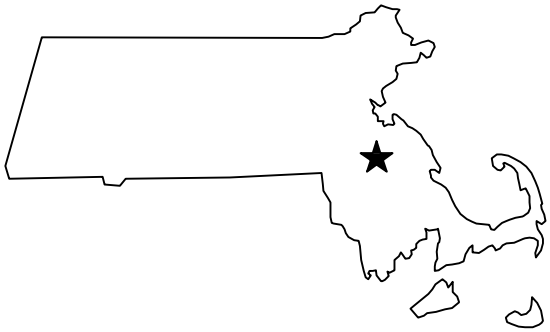
3. "Total Annual O&M Cost" are the total costs (discounted with an annual rate of 7 percent) that occur annually during the course of alternative operation (e.g., routine operation, maintenance, and monitoring).

4. "Total Periodic Costs" are the total costs (discounted with an annual rate of 7 percent) that occur during the course of alternative operation that are not routine annual O&M costs (e.g., five-year reviews).

5. "Total Present Value" is the total alternative cost (including Capital, O&M, and Periodic Costs) discounted at an annual rate of 7 percent.

6. Refer to the text and appendices of this report for additional information regarding costs.





NOTES:

BASE MAP TAKEN FROM MASSGIS WEBSIDE
7.5 MINUTE USGS QUADRANGLE MAP(s):
MEDFIELD, MASSACHUSETTS, REVISED: 1987

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE WALPOLE, MASSACHUSETTS	**FEASIBILITY STUDY REPORT LOCUS PLAN**
	SCALE: 1"=2000'
	DATE: OCT 07
	FILE NO.2032.01
	FIGURE NO.1

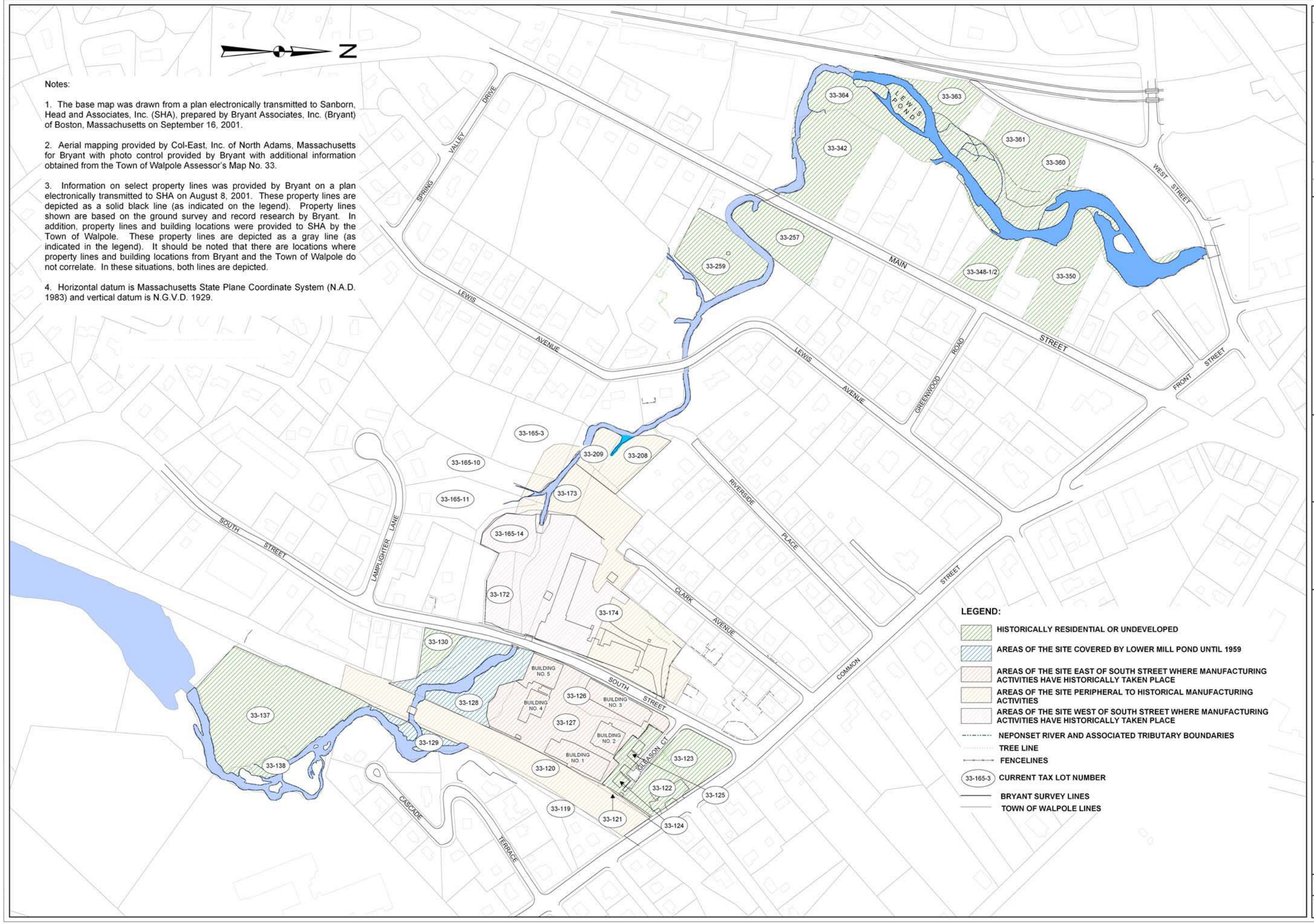
Notes:

1. The base map was drawn from a plan electronically transmitted to Sanborn, Head and Associates, Inc. (SHA), prepared by Bryant Associates, Inc. (Bryant) of Boston, Massachusetts on September 16, 2001.

2. Aerial mapping provided by Col-East, Inc. of North Adams, Massachusetts for Bryant with photo control provided by Bryant with additional information obtained from the Town of Walpole Assessor's Map No. 33.

3. Information on select property lines was provided by Bryant on a plan electronically transmitted to SHA on August 8, 2001. These property lines are depicted as a solid black line (as indicated on the legend). Property lines shown are based on the ground survey and record research by Bryant. In addition, property lines and building locations were provided to SHA by the Town of Walpole. These property lines are depicted as a gray line (as indicated in the legend). It should be noted that there are locations where property lines and building locations from Bryant and the Town of Walpole do not correlate. In these situations, both lines are depicted.

4. Horizontal datum is Massachusetts State Plane Coordinate System (N.A.D. 1983) and vertical datum is N.G.V.D. 1929.



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
150 0 150 300 450

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SITE VICINITY PLAN

PROJECT NUMBER : 2032.01

FIGURE NUMBER : 2

Notes:

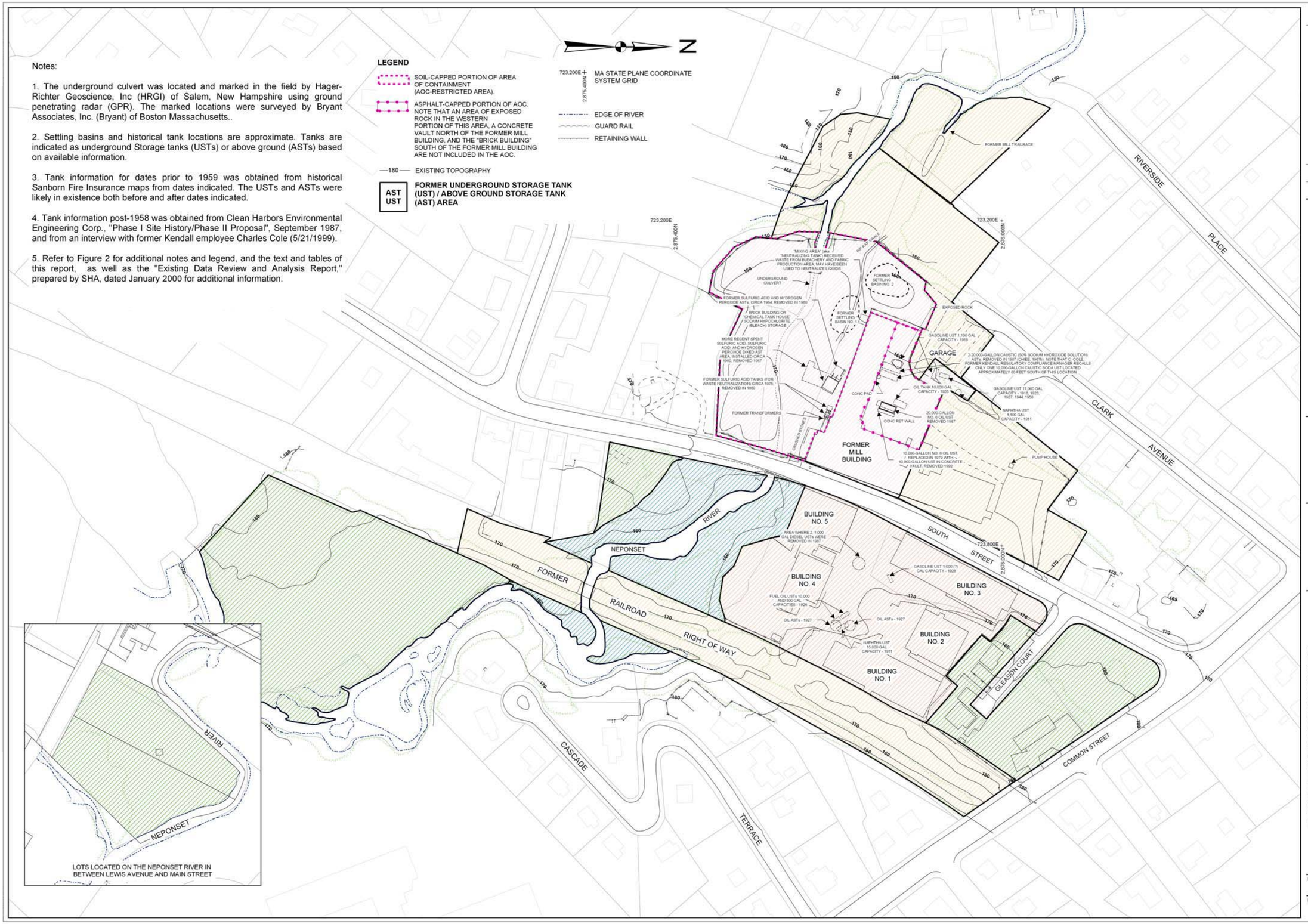
1. The underground culvert was located and marked in the field by Hager-Richter Geoscience, Inc (HRGI) of Salem, New Hampshire using ground penetrating radar (GPR). The marked locations were surveyed by Bryant Associates, Inc. (Bryant) of Boston Massachusetts..

2. Settling basins and historical tank locations are approximate. Tanks are indicated as underground Storage tanks (USTs) or above ground (ASTs) based on available information.

3. Tank information for dates prior to 1959 was obtained from historical Sanborn Fire Insurance maps from dates indicated. The USTs and ASTs were likely in existence both before and after dates indicated.

4. Tank information post-1958 was obtained from Clean Harbors Environmental Engineering Corp., "Phase I Site History/Phase II Proposal", September 1987, and from an interview with former Kendall employee Charles Cole (5/21/1999).

5. Refer to Figure 2 for additional notes and legend, and the text and tables of this report, as well as the "Existing Data Review and Analysis Report," prepared by SHA, dated January 2000 for additional information.



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
50 25 0 50 100 150 200 Feet

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SITE FEATURE PLAN

PROJECT NUMBER : 2032.01

FIGURE NUMBER : 3

Notes:

1. Soil borings SB-04 through SB-73 (excluding SB-09A, SB-34, SB-35, SB-37, SB-38, SB-54, SB-55, SB-56, SB-57, SH-16D, SH-20S-A, SH-23S-A/B, and Underground Storage Tank (UST) locations UST-1 through UST-6) were completed by D.L. Maher Company (Maher) of North Reading, Massachusetts or Maher's Subcontractor, Boart Longyear of Salt Lake City, Utah between December 2000 and August 2001 under the direction of SHA.

2. Soil borings SB-01, SB-02, SB-03, SB-34, SB-35, SB-37, SB-38, SB-54, SB-55, SB-56, and SB-57 were completed by SHA between February 2001 and May 2001 using a hand auger.

3. The locations and elevations of soil borings SB-01 through SB-73 (excluding SB-09A, SB-10, SB-11, SB-16, SB-19, SB-22, SB-26A, SB-27, SB-54, SB-55, SB-56, SB-57, SH-16D, SH-23S-A/B and UST locations UST-1 through UST-6) were surveyed by Bryant Associates, Inc. (Bryant) between April and December 2001 and were transmitted electronically to SHA in January 2002.

4. The locations of soil borings SB-10, SB-11, SB-16, SB-19, SB-22, SB-26A, SB-27, SB-54, SB-55, SB-56, SB-57 and SH-20S-A (located within building interiors) were located in the field using cloth tape measurements from prominent site features by SHA. The accuracy of these locations is limited to the method of measurement used.

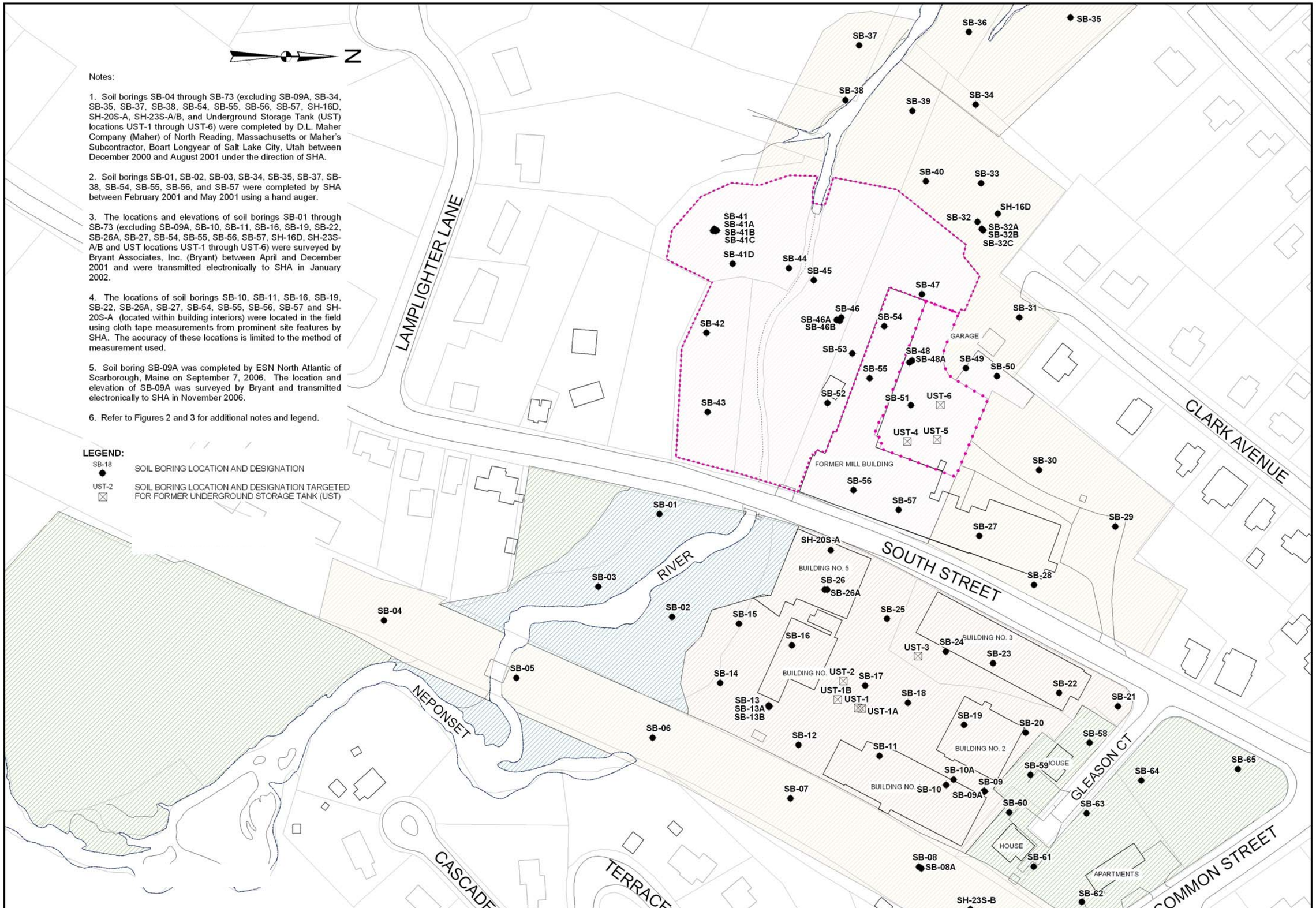
5. Soil boring SB-09A was completed by ESN North Atlantic of Scarborough, Maine on September 7, 2006. The location and elevation of SB-09A was surveyed by Bryant and transmitted electronically to SHA in November 2006.

6. Refer to Figures 2 and 3 for additional notes and legend.

LEGEND:

SB-18 ● SOIL BORING LOCATION AND DESIGNATION

UST-2 ⊠ SOIL BORING LOCATION AND DESIGNATION TARGETED FOR FORMER UNDERGROUND STORAGE TANK (UST)



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
60 0 60 120 180

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

EXPLORATION LOCATION PLAN
SOIL BORINGS

PROJECT NUMBER
2032.01

FIGURE NUMBER
4

Notes:

1. Monitoring wells SH-1S/D/R through SH-23S were completed by D.L. Maher Company (Maher) of North Reading, Massachusetts or Maher's subcontractor Boart Longyear of Salt Lake City, Utah between December 2000 and August 2001 with observation by Sanborn, Head & Associates, Inc. (SHA).

2. Staff gauges SG-101 through SG-110 were established by SHA in February and March 2001. Staff gauges SG-111, SG-112, and SG-113, and SG-114 were established by SHA in October and December 2001, respectively.

3. Monitoring wells SH-17D/R and SH-24S/R through SH-28S/D/R were completed by Environmental Drilling, Inc. of Sterling, Massachusetts between August and November 2003 with observation by SHA.

4. Well points WP-01 through WP-07 were installed manually by SHA personnel between September 8 and 10, 2003.

5. The locations and elevations of staff gauges SG-101 through SG-113 were surveyed by Bryant Associates, Inc. of Boston, Massachusetts (Bryant) between April and December 2001 and were transmitted electronically to SHA in January 2002. Well points WP-01 through WP-07 and monitoring wells SH-17D/R and SH-24S/R through SH-28S/D/R were surveyed by Bryant between October and November 2003 and were submitted electronically to SHA in November 2003.

6. The location of SG-114 was located in the field using cloth tape measurements from the downstream end of the Neponset River culvert by SHA. The accuracy of this location is limited to the method of measurement used.

7. On September 19, 2006 SHA installed replacement staff gauges SG-101B, SG-105B, SG-108B, and SG-111B. The replacement staff gauges were surveyed by Bryant on January 16, 17, and 18, 2007. Additionally, Bryant conducted an elevation survey check of several well point and staff gauge locations that were suspected of potential movement since their initial installation. Changes in the reference elevations were recorded in the project database.

8. Staff gauges indicated are locations where surface water elevations were measured in 2006. Refer to Figure 5 of the Remedial Investigation Report for locations of other staff gauges.

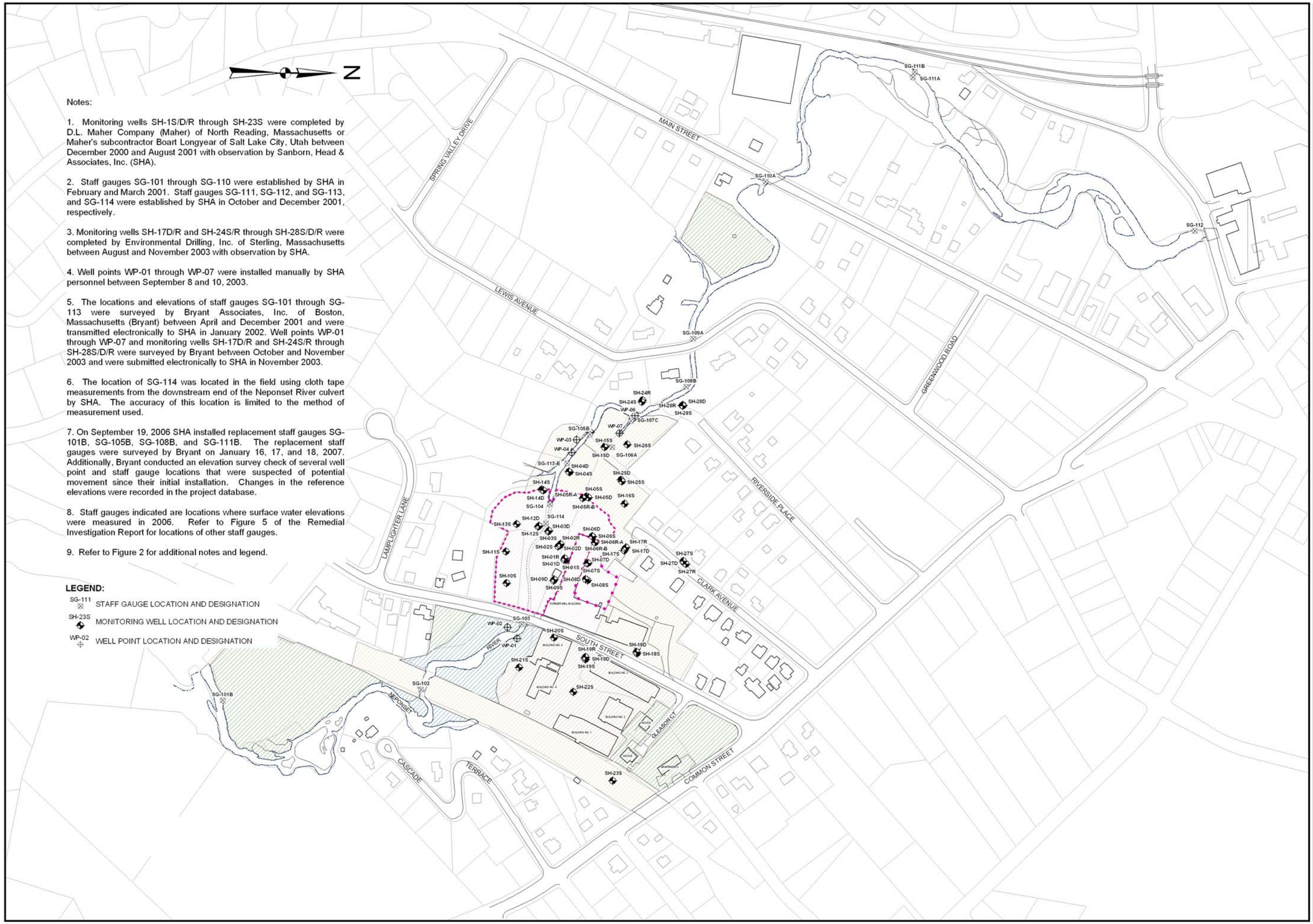
9. Refer to Figure 2 for additional notes and legend.

LEGEND:

SG-111 STAFF GAUGE LOCATION AND DESIGNATION

SH-23S MONITORING WELL LOCATION AND DESIGNATION

WP-02 WELL POINT LOCATION AND DESIGNATION



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE

150 75 0 150 300 450 Feet

FEASIBILITY STUDY REPORT

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE

WALPOLE, MASSACHUSETTS

EXPLORATION LOCATION PLAN - GROUNDWATER MONITORING WELLS, WELL POINTS AND STAFF GAUGES

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 5

Notes:

1. Surface water sampling locations (SW-102 through SW-108) and surface water reference (SWR) sampling locations (SWR-1 through SWR-5) were established by Sanborn, Head & Associates, Inc. (SHA) in February and March 2001.

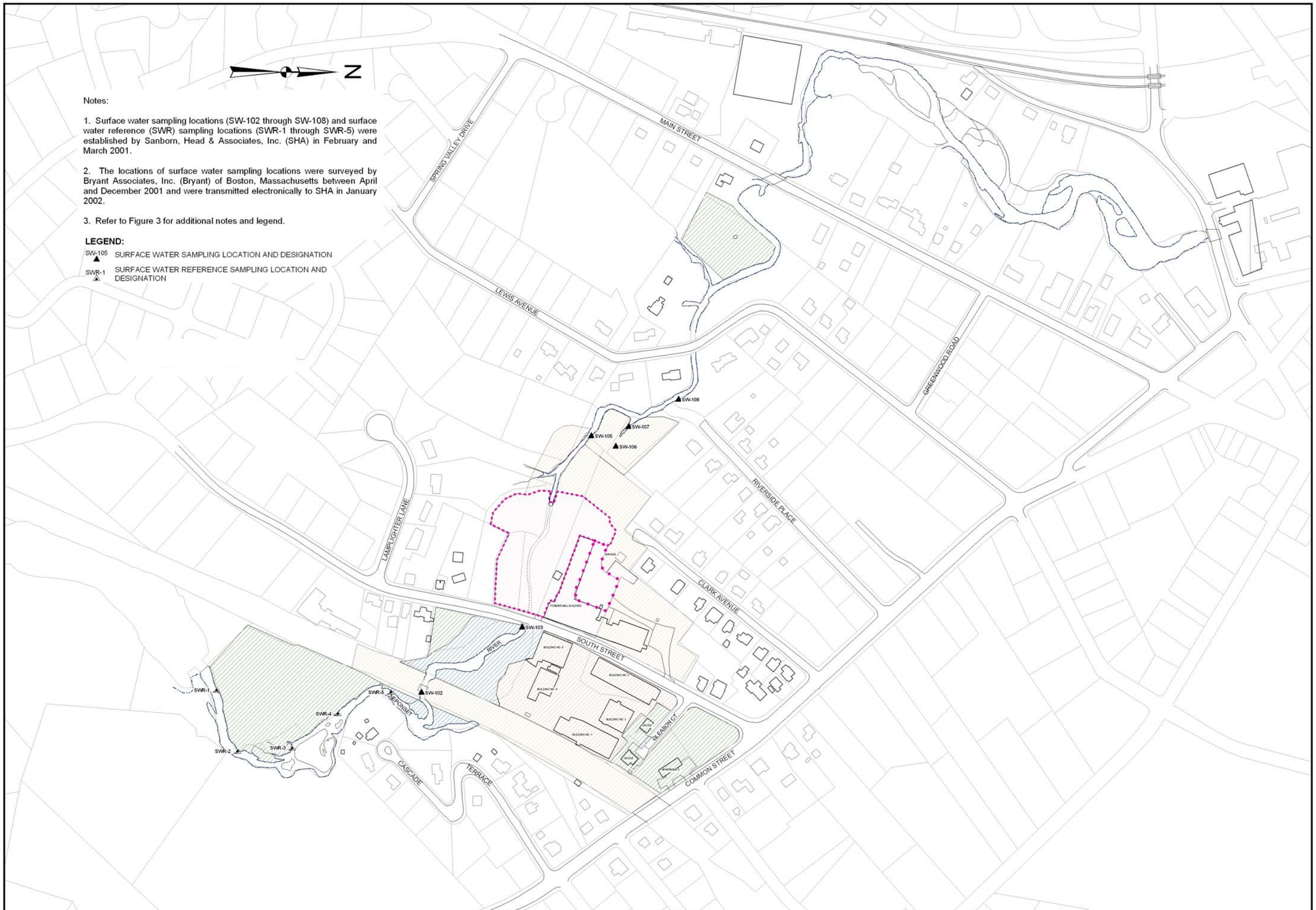
2. The locations of surface water sampling locations were surveyed by Bryant Associates, Inc. (Bryant) of Boston, Massachusetts between April and December 2001 and were transmitted electronically to SHA in January 2002.

3. Refer to Figure 3 for additional notes and legend.

LEGEND:

SW-105 ▲ SURFACE WATER SAMPLING LOCATION AND DESIGNATION

SWR-1 ▲ SURFACE WATER REFERENCE SAMPLING LOCATION AND DESIGNATION



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE

150 75 0 150 300 450 Feet

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

EXPLORATION LOCATION PLAN
SURFACE WATER SAMPLING LOCATIONS

PROJECT NUMBER
2032.01

FIGURE NUMBER
6

Notes:

1. Lewis Pond (LP) sediment sampling locations (LP-01 through LP-10); Neponset River (NR) sediment sampling locations (NR-1 through NR-8); Neponset River reference (SedRN) sampling locations (SedRN-1 through SedRN-5); tailrace (TR) sediment sampling locations (TR-1 through TR-5); floodplain (FP) sampling locations (FP-01 through FP-10, excluding FP-07 and FP-09A through FP-09F); and floodplain reference (FPR) sampling locations (FPR-01 through FPR-10) were established by SHA in October 2001. FP sampling locations FP-09A through FP-09F were established by SHA in October 2006.

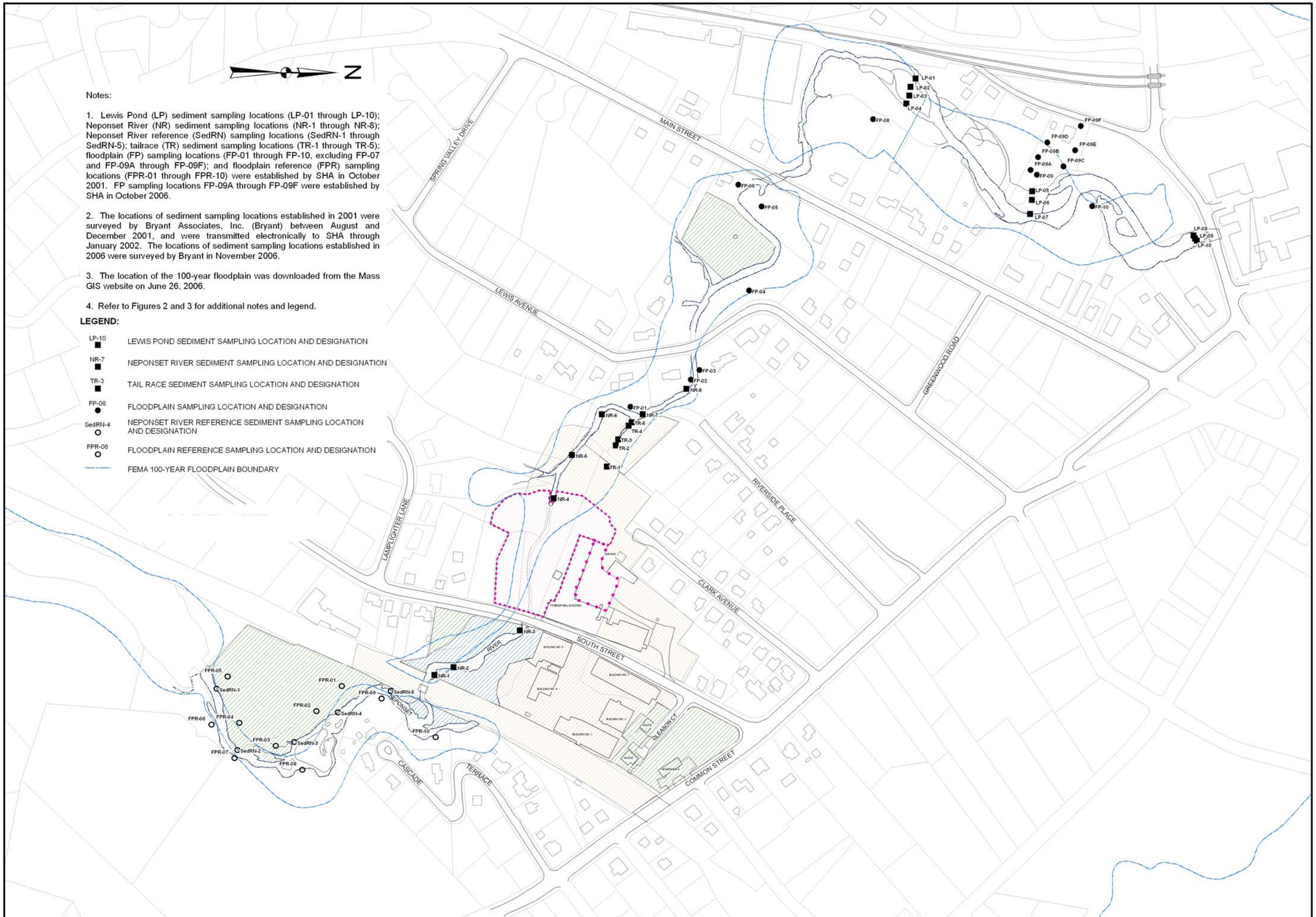
2. The locations of sediment sampling locations established in 2001 were surveyed by Bryant Associates, Inc. (Bryant) between August and December 2001, and were transmitted electronically to SHA through January 2002. The locations of sediment sampling locations established in 2006 were surveyed by Bryant in November 2006.

3. The location of the 100-year floodplain was downloaded from the Mass GIS website on June 26, 2006.

4. Refer to Figures 2 and 3 for additional notes and legend.

LEGEND:

LP-10 ■	LEWIS POND SEDIMENT SAMPLING LOCATION AND DESIGNATION
NR-7 ■	NEPONSET RIVER SEDIMENT SAMPLING LOCATION AND DESIGNATION
TR-3 ■	TAIL RACE SEDIMENT SAMPLING LOCATION AND DESIGNATION
FP-06 ●	FLOODPLAIN SAMPLING LOCATION AND DESIGNATION
SedRN-4 ○	NEPONSET RIVER REFERENCE SEDIMENT SAMPLING LOCATION AND DESIGNATION
FPR-06 ○	FLOODPLAIN REFERENCE SAMPLING LOCATION AND DESIGNATION
— — —	FEMA 100-YEAR FLOODPLAIN BOUNDARY



NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

EXPLORATION LOCATION PLAN - SEDIMENT AND FLOOD PLAIN SAMPLE LOCATIONS

PROJECT NUMBER
2032.01

FIGURE NUMBER
7

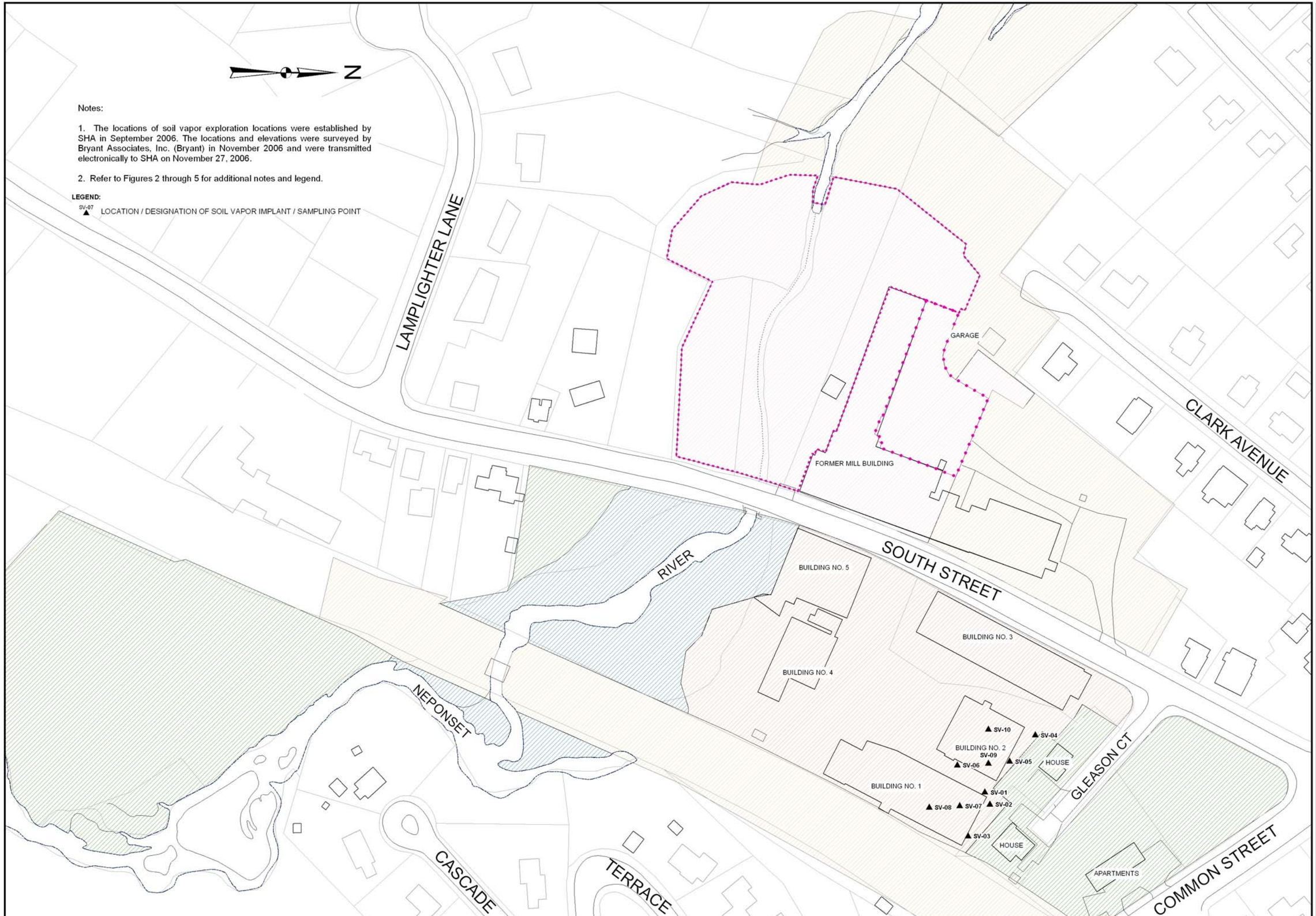
Notes:

1. The locations of soil vapor exploration locations were established by SHA in September 2006. The locations and elevations were surveyed by Bryant Associates, Inc. (Bryant) in November 2006 and were transmitted electronically to SHA on November 27, 2006.

2. Refer to Figures 2 through 5 for additional notes and legend.

LEGEND:

SV-07 ▲ LOCATION / DESIGNATION OF SOIL VAPOR IMPLANT / SAMPLING POINT



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
60 0 60 120 180

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

EXPLORATION LOCATION PLAN
SOIL VAPOR SAMPLING LOCATIONS

PROJECT NUMBER
2032.01

FIGURE NUMBER
8

Notes:

1. The groundwater elevation contours shown are based on groundwater and surface water levels measured by SHA personnel on September 19, 2006. The groundwater level at SH-21S was measured on September 29, 2006.

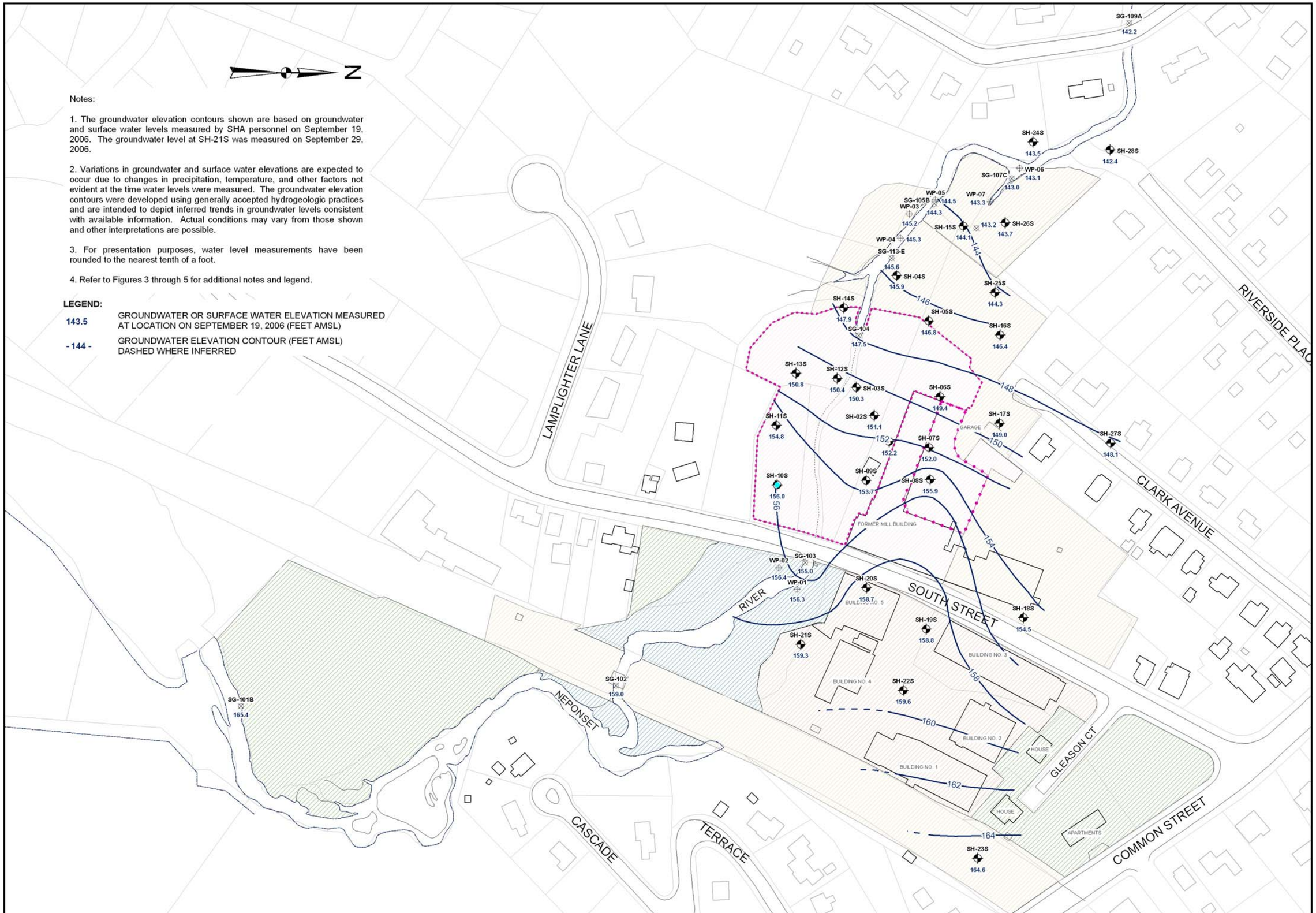
2. Variations in groundwater and surface water elevations are expected to occur due to changes in precipitation, temperature, and other factors not evident at the time water levels were measured. The groundwater elevation contours were developed using generally accepted hydrogeologic practices and are intended to depict inferred trends in groundwater levels consistent with available information. Actual conditions may vary from those shown and other interpretations are possible.

3. For presentation purposes, water level measurements have been rounded to the nearest tenth of a foot.

4. Refer to Figures 3 through 5 for additional notes and legend.

LEGEND:

143.5	GROUNDWATER OR SURFACE WATER ELEVATION MEASURED AT LOCATION ON SEPTEMBER 19, 2006 (FEET AMSL)
- 144 -	GROUNDWATER ELEVATION CONTOUR (FEET AMSL) DASHED WHERE INFERRED



GRAPHICAL SCALE
Feet
80 0 80 160 240

NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SHALLOW GROUNDWATER ELEVATION CONTOUR PLAN - SEPTEMBER 2006

PROJECT NUMBER
2032.01

FIGURE NUMBER
9

Notes:

1. The groundwater elevation contours shown are based on groundwater levels measured by SHA personnel on September 19, 2006.

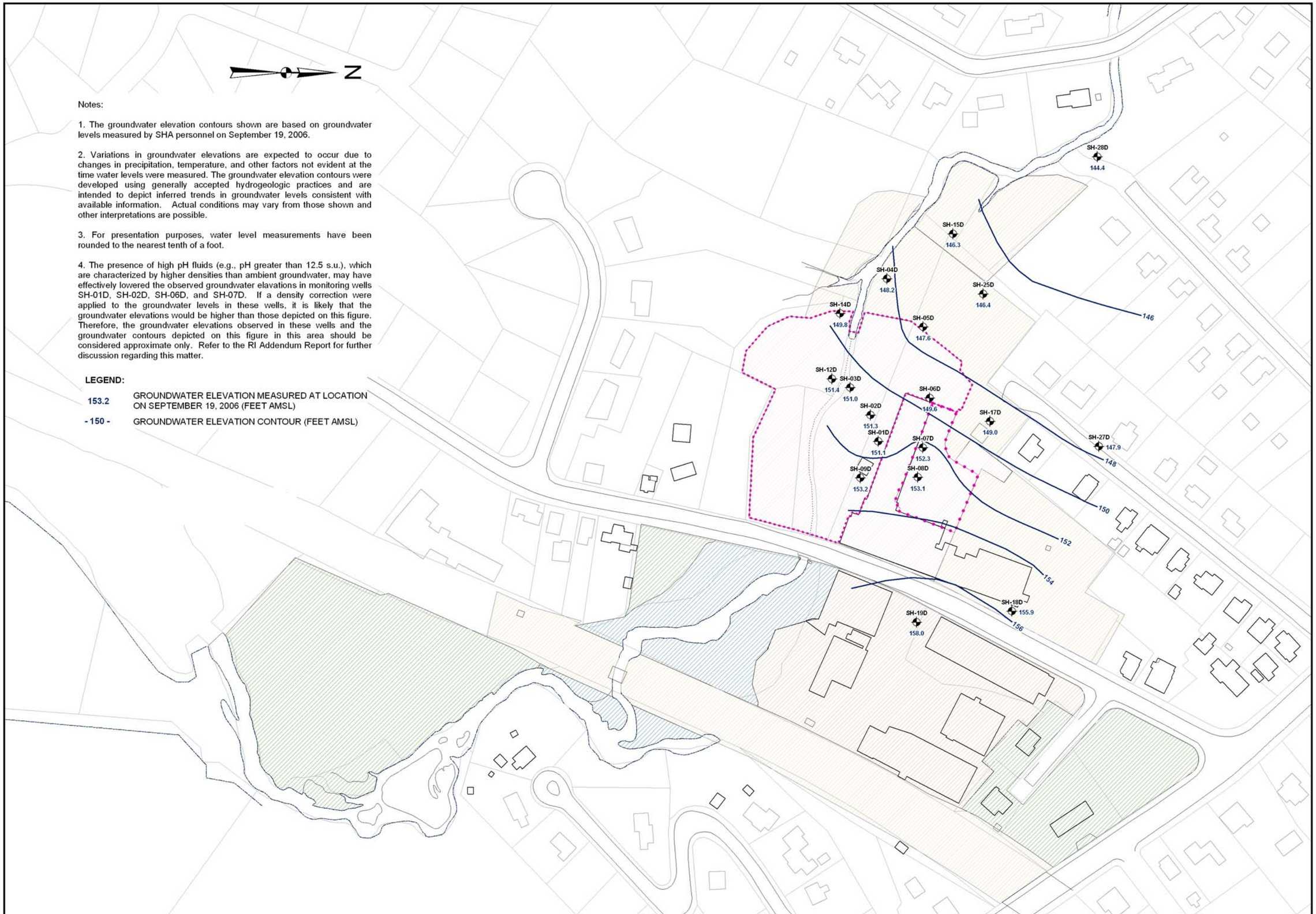
2. Variations in groundwater elevations are expected to occur due to changes in precipitation, temperature, and other factors not evident at the time water levels were measured. The groundwater elevation contours were developed using generally accepted hydrogeologic practices and are intended to depict inferred trends in groundwater levels consistent with available information. Actual conditions may vary from those shown and other interpretations are possible.

3. For presentation purposes, water level measurements have been rounded to the nearest tenth of a foot.

4. The presence of high pH fluids (e.g., pH greater than 12.5 s.u.), which are characterized by higher densities than ambient groundwater, may have effectively lowered the observed groundwater elavations in monitoring wells SH-01D, SH-02D, SH-06D, and SH-07D. If a density correction were applied to the groundwater levels in these wells, it is likely that the groundwater elevations would be higher than those depicted on this figure. Therefore, the groundwater elevations observed in these wells and the groundwater contours depicted on this figure in this area should be considered approximate only. Refer to the RI Addendum Report for further discussion regarding this matter.

LEGEND:

153.2	GROUNDWATER ELEVATION MEASURED AT LOCATION ON SEPTEMBER 19, 2006 (FEET AMSL)
- 150 -	GROUNDWATER ELEVATION CONTOUR (FEET AMSL)



GRAPHICAL SCALE
Feet
80 0 80 160 240

NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DEEP GROUNDWATER ELEVATION CONTOUR PLAN - SEPTEMBER 2006

PROJECT NUMBER
2032.01

FIGURE NUMBER
10

Notes:

1. The groundwater elevation contours shown are based on groundwater levels measured by SHA personnel on September 19, 2006.

2. Variations in groundwater elevations are expected to occur due to changes in precipitation, temperature, and other factors not evident at the time water levels were measured.The groundwater elevation contours were developed using generally accepted hydrogeologic practices and are intended to depict inferred trends in groundwater levels consistent with available information. Actual conditions may vary from those shown and other interpretations are possible.

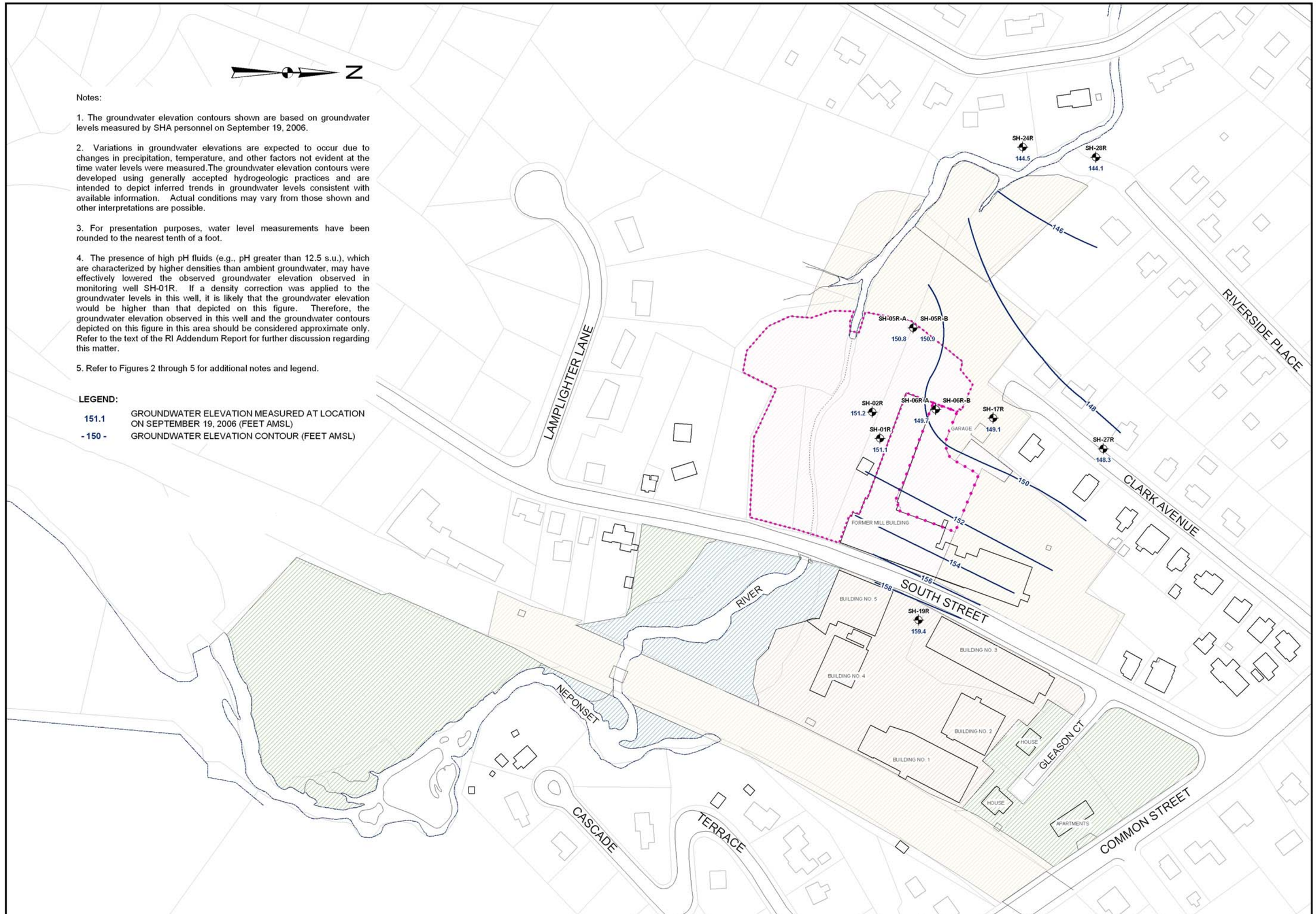
3. For presentation purposes, water level measurements have been rounded to the nearest tenth of a foot.

4. The presence of high pH fluids (e.g., pH greater than 12.5 s.u.), which are characterized by higher densities than ambient groundwater, may have effectively lowered the observed groundwater elevation observed in monitoring well SH-01R. If a density correction was applied to the groundwater levels in this well, it is likely that the groundwater elevation would be higher than that depicted on this figure. Therefore, the groundwater elevation observed in this well and the groundwater contours depicted on this figure in this area should be considered approximate only. Refer to the text of the RI Addendum Report for further discussion regarding this matter.

5. Refer to Figures 2 through 5 for additional notes and legend.

LEGEND:

151.1	GROUNDWATER ELEVATION MEASURED AT LOCATION ON SEPTEMBER 19, 2006 (FEET AMSL)
- 150 -	GROUNDWATER ELEVATION CONTOUR (FEET AMSL)



NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

BEDROCK GROUNDWATER ELEVATION CONTOUR PLAN - SEPTEMBER 2006

PROJECT NUMBER
2032.01

FIGURE NUMBER
11

NOTES:

1. The distribution of total polynuclear aromatic hydrocarbons (PAHs) in upper soils (0 to 1 foot below the ground surface) is Based on samples collected by SHA personnel between February 21 and July 23, 2001. Samples were analyzed by Woods Hole group Laboratory of Raynham, Massachusetts for semi-volatile organic compounds (SVOCs) using United States Environmental Protection Agency (USEPA) Method 8270c and 8270c-SIM.

2. Total PAH contours were developed based on interpolation between widely-spaced sampling locations. Actual conditions May vary from those shown and other interpretations are possible.

3. Refer to Figures 2 through 4 for additional notes and legend.

LEGEND:

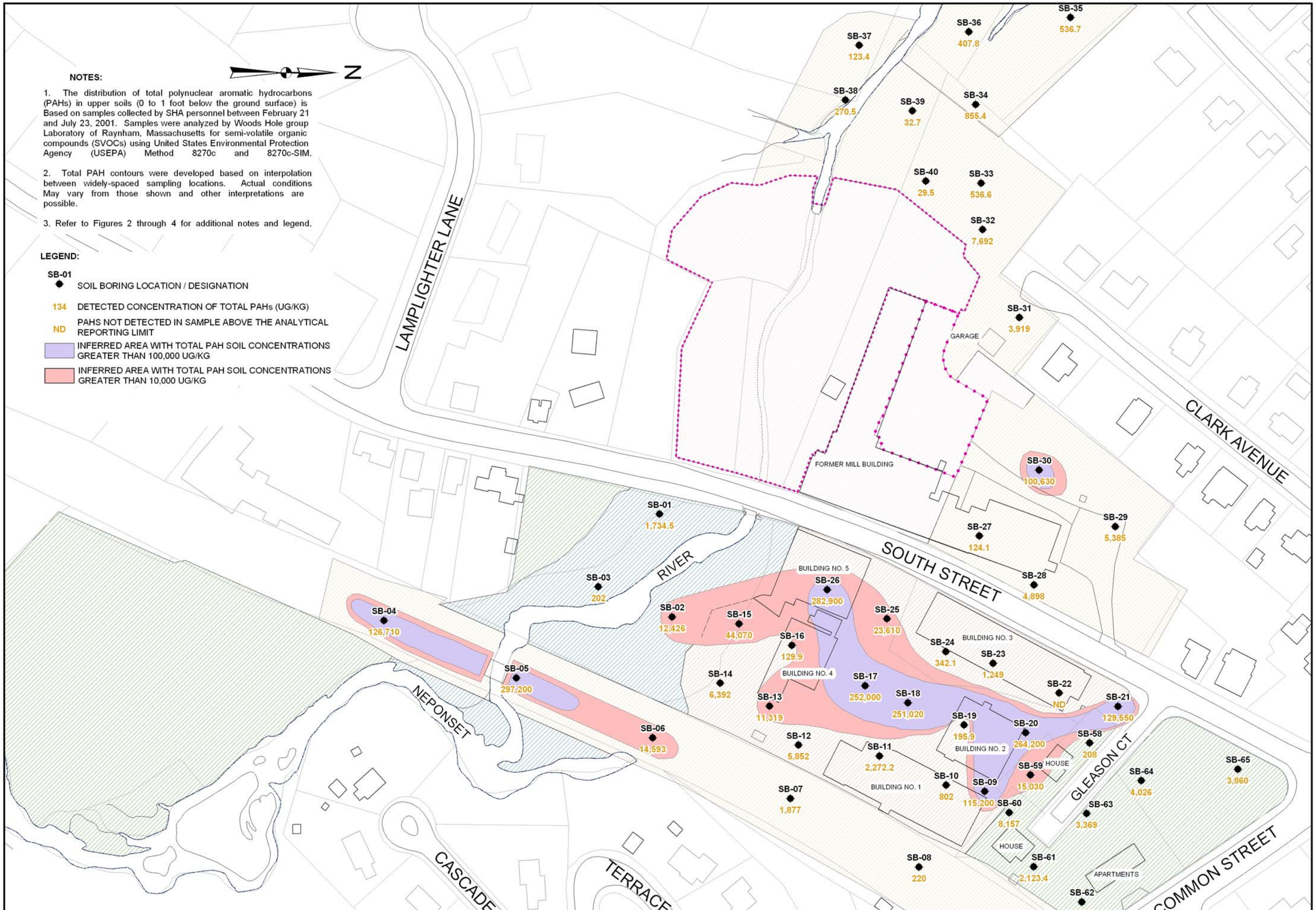
SB-01 — SOIL BORING LOCATION / DESIGNATION

134 — DETECTED CONCENTRATION OF TOTAL PAHs (UG/KG)

ND — PAHS NOT DETECTED IN SAMPLE ABOVE THE ANALYTICAL REPORTING LIMIT

INFERRED AREA WITH TOTAL PAH SOIL CONCENTRATIONS GREATER THAN 100,000 UG/KG

INFERRED AREA WITH TOTAL PAH SOIL CONCENTRATIONS GREATER THAN 10,000 UG/KG



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE — Feet: 60, 0, 60, 120, 180

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF TOTAL PAHs IN UPPER SOILS

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 12

NOTES:

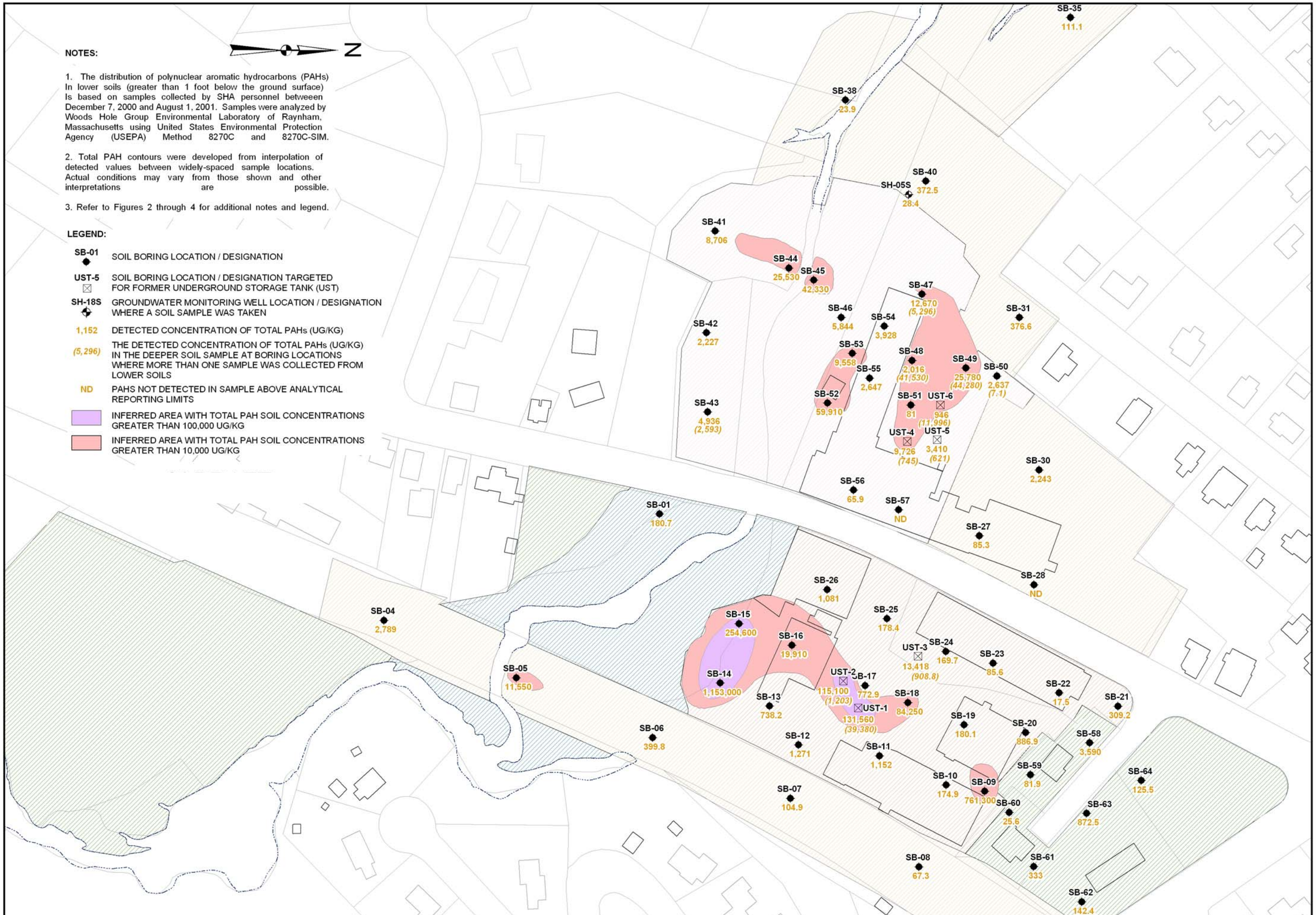
1. The distribution of polynuclear aromatic hydrocarbons (PAHs) In lower soils (greater than 1 foot below the ground surface) Is based on samples collected by SHA personnel betweeen December 7, 2000 and August 1, 2001. Samples were analyzed by Woods Hole Group Environmental Laboratory of Raynham, Massachusetts using United States Environmental Protection Agency (USEPA) Method 8270C and 8270C-SIM.

2. Total PAH contours were developed from interpolation of detected values between widely-spaced sample locations. Actual conditions may vary from those shown and other interpretations are possible.

3. Refer to Figures 2 through 4 for additional notes and legend.

LEGEND:

SB-01	SOIL BORING LOCATION / DESIGNATION
UST-5	SOIL BORING LOCATION / DESIGNATION TARGETED FOR FORMER UNDERGROUND STORAGE TANK (UST)
SH-18S	GROUNDWATER MONITORING WELL LOCATION / DESIGNATION WHERE A SOIL SAMPLE WAS TAKEN
1,152	DETECTED CONCENTRATION OF TOTAL PAHs (UG/KG)
(5,296)	THE DETECTED CONCENTRATION OF TOTAL PAHs (UG/KG) IN THE DEEPER SOIL SAMPLE AT BORING LOCATIONS WHERE MORE THAN ONE SAMPLE WAS COLLECTED FROM LOWER SOILS
ND	PAHS NOT DETECTED IN SAMPLE ABOVE ANALYTICAL REPORTING LIMITS
	INFERRED AREA WITH TOTAL PAH SOIL CONCENTRATIONS GREATER THAN 100,000 UG/KG
	INFERRED AREA WITH TOTAL PAH SOIL CONCENTRATIONS GREATER THAN 10,000 UG/KG



NO	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
60 0 60 120 180

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF TOTAL PAHs IN LOWER SOILS

PROJECT NUMBER
2032.01

FIGURE NUMBER
13

Notes:

1. The distribution of trichloroethene in soils is based on samples collected by SHA personnel December 7, 2000, August 1, 2001 and September 7, 2006. Samples were analyzed by Woods Hole Group Environmental Laboratory of Raynham, Massachusetts for volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method 8260B.

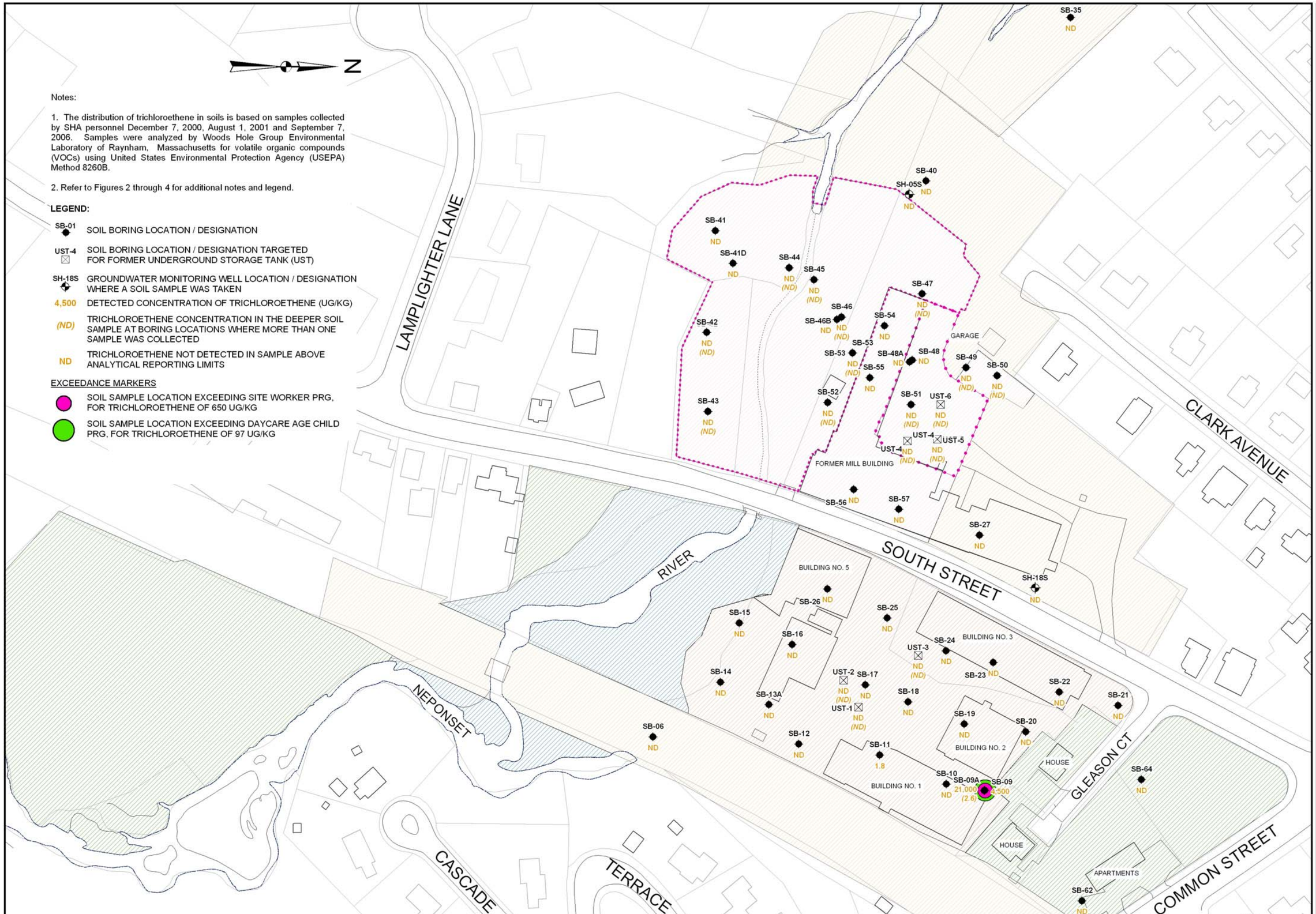
2. Refer to Figures 2 through 4 for additional notes and legend.

LEGEND:

- SB-01 — SOIL BORING LOCATION / DESIGNATION
- UST-4 — SOIL BORING LOCATION / DESIGNATION TARGETED FOR FORMER UNDERGROUND STORAGE TANK (UST)
- SH-18S — GROUNDWATER MONITORING WELL LOCATION / DESIGNATION WHERE A SOIL SAMPLE WAS TAKEN
- 4,500 — DETECTED CONCENTRATION OF TRICHLOROETHENE (UG/KG)
- (ND) — TRICHLOROETHENE CONCENTRATION IN THE DEEPER SOIL SAMPLE AT BORING LOCATIONS WHERE MORE THAN ONE SAMPLE WAS COLLECTED
- ND — TRICHLOROETHENE NOT DETECTED IN SAMPLE ABOVE ANALYTICAL REPORTING LIMITS

EXCEEDANCE MARKERS

- SOIL SAMPLE LOCATION EXCEEDING SITE WORKER PRG, FOR TRICHLOROETHENE OF 650 UG/KG
- SOIL SAMPLE LOCATION EXCEEDING DAYCARE AGE CHILD PRG, FOR TRICHLOROETHENE OF 97 UG/KG



NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF TRICHLOROETHENE IN LOWER SOILS

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 14-A

Notes:

1. The distribution of trichloroethene in soil vapor is based on samples collected by SHA personnel on September 6 and 7, 2006. Samples were analyzed by Alpha Woods Hole Laboratory of Westborough, Massachusetts for VOCs by USEPA Method TO-15.

2.Soil vapor results are presented in units of (micrograms per cubic meter (ug/m3). "ND" indicates that trichloroethene was not detected above the laboratory reporting limit.

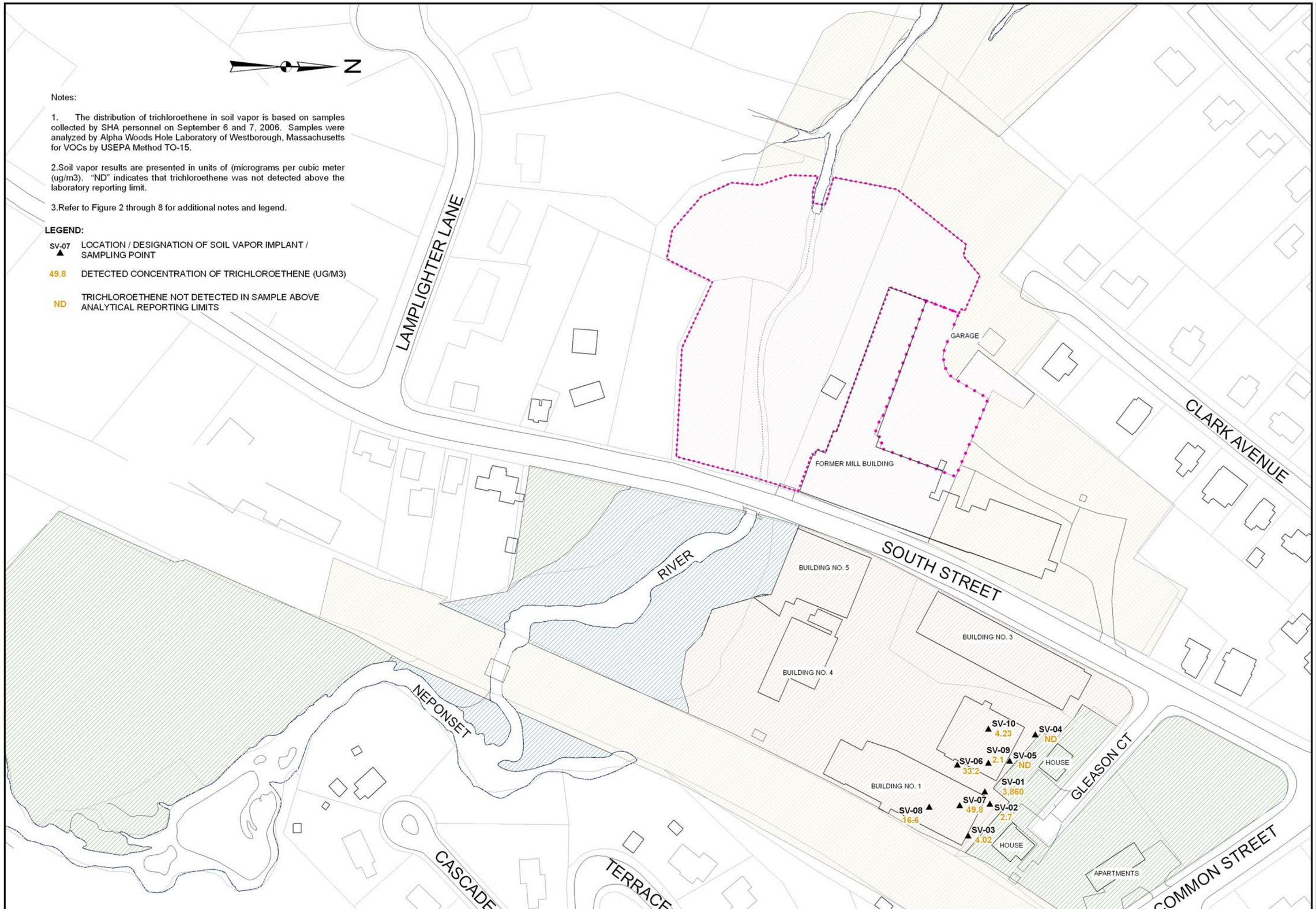
3.Refer to Figure 2 through 8 for additional notes and legend.

LEGEND:

SV-07 ▲ LOCATION / DESIGNATION OF SOIL VAPOR IMPLANT / SAMPLING POINT

49.8 DETECTED CONCENTRATION OF TRICHLOROETHENE (UG/M3)

ND TRICHLOROETHENE NOT DETECTED IN SAMPLE ABOVE ANALYTICAL REPORTING LIMITS



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
60 0 60 120 180

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF TRICHLOROETHENE IN SOIL VAPOR

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 14-B

NOTES:

1. The distribution of arsenic in upper soils (0 to 1 foot below the ground surface) is based on samples collected by SHA personnel between February 21 and July 23, 2001. Samples were analyzed by Woods Hole Group Environmental Laboratory of Raynham, Massachusetts for metals, including arsenic, using United States Environmental Protection Agency (USEPA) Method 6010B/6020.

2. Refer to Figures 2 through 4 for additional notes and legend.

LEGEND:

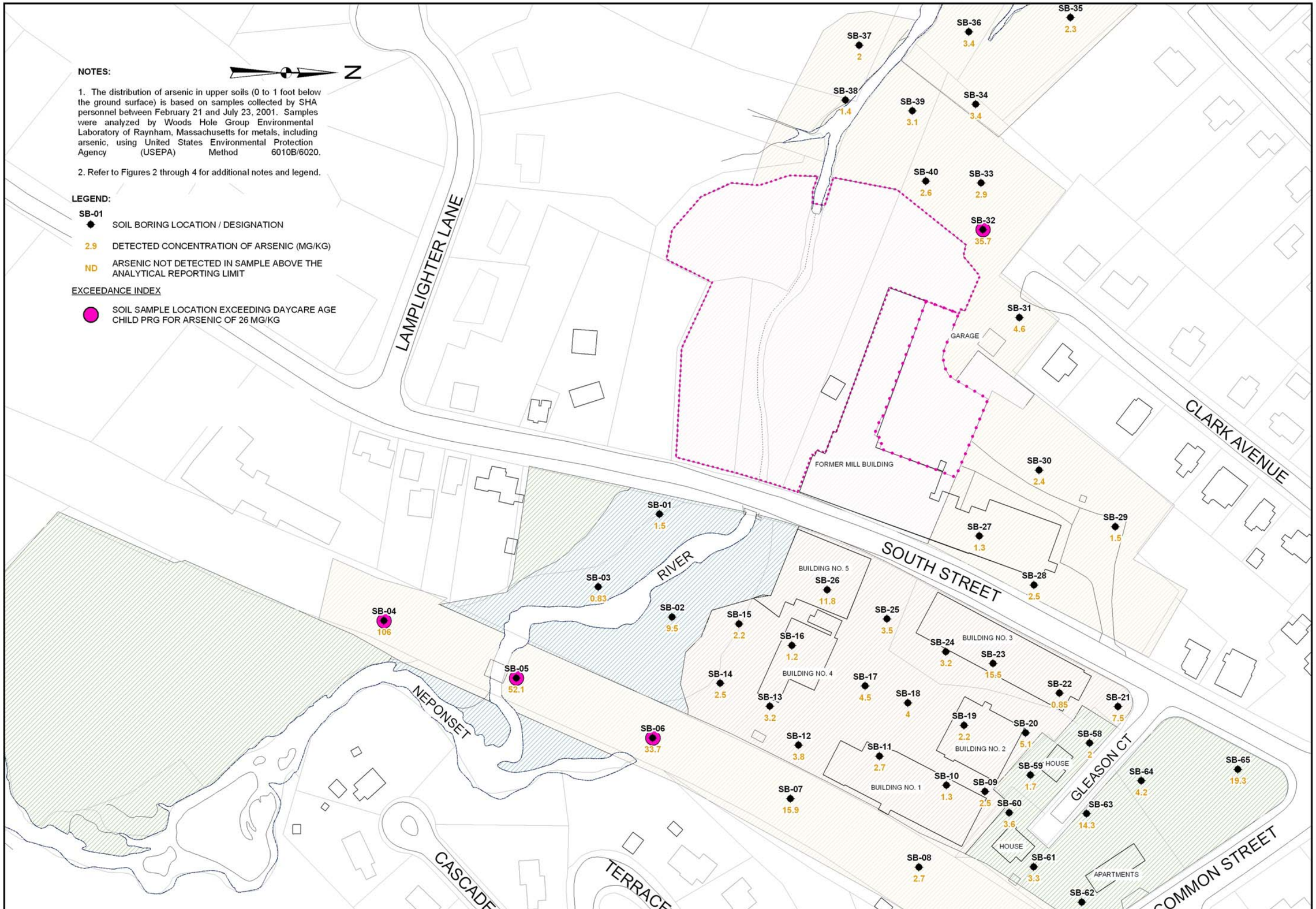
SB-01 ◆ SOIL BORING LOCATION / DESIGNATION

2.9 DETECTED CONCENTRATION OF ARSENIC (MG/KG)

ND ARSENIC NOT DETECTED IN SAMPLE ABOVE THE ANALYTICAL REPORTING LIMIT

EXCEEDANCE INDEX

● SOIL SAMPLE LOCATION EXCEEDING DAYCARE AGE CHILD PRG FOR ARSENIC OF 26 MG/KG



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
60 0 60 120 180

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF ARSENIC IN UPPER SOILS

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 15

NOTES:

1. The distribution of arsenic in lower soils (greater than 1 foot below the ground surface) is based on samples collected by SHA personnel between December 7, 2000 and August 1, 2001. Samples were analyzed by Woods Hole Group Environmental Laboratory of Raynham, Massachusetts for metals, including arsenic, using United States Environmental Protection Agency (USEPA) Method 6010B/6020.

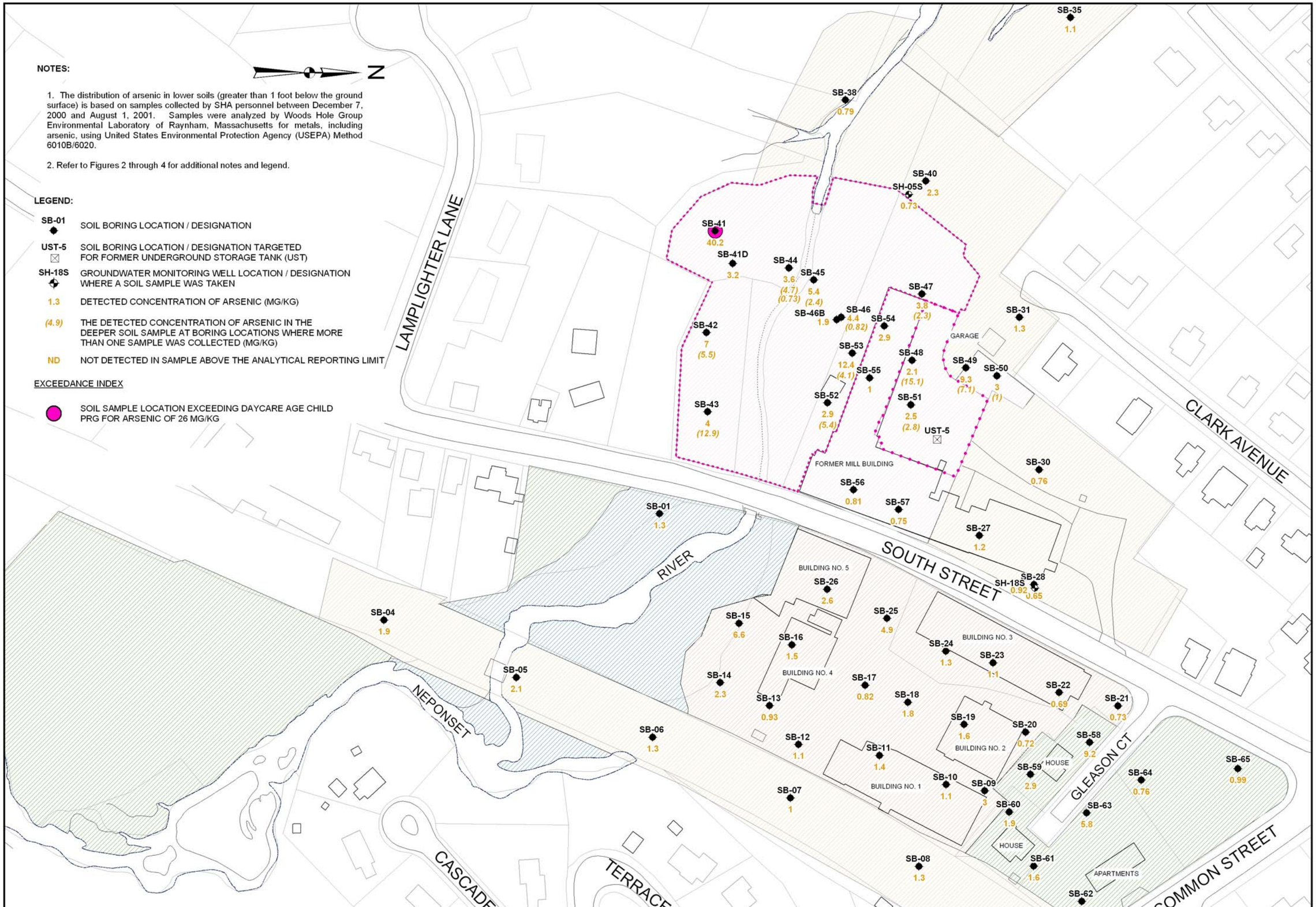
2. Refer to Figures 2 through 4 for additional notes and legend.

LEGEND:

SB-01	SOIL BORING LOCATION / DESIGNATION
UST-5	SOIL BORING LOCATION / DESIGNATION TARGETED FOR FORMER UNDERGROUND STORAGE TANK (UST)
SH-18S	GROUNDWATER MONITORING WELL LOCATION / DESIGNATION WHERE A SOIL SAMPLE WAS TAKEN
1.3	DETECTED CONCENTRATION OF ARSENIC (MG/KG)
(4.9)	THE DETECTED CONCENTRATION OF ARSENIC IN THE DEEPER SOIL SAMPLE AT BORING LOCATIONS WHERE MORE THAN ONE SAMPLE WAS COLLECTED (MG/KG)
ND	NOT DETECTED IN SAMPLE ABOVE THE ANALYTICAL REPORTING LIMIT

EXCEEDANCE INDEX

SOIL SAMPLE LOCATION EXCEEDING DAYCARE AGE CHILD PRG FOR ARSENIC OF 26 MG/KG



NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF ARSENIC IN LOWER SOILS

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 16

NOTES:

1. The distribution of asbestos in on-Site soil is based on samples collected by the USEPA's oversight contractor, Metcalf & Eddy, Inc. (M&E).

2. Samples were collected by M&E and submitted for asbestos analysis. Concentrations in soil samples collected from these soil borings based on information in M&E's "Data Evaluation Report for Additional Asbestos Investigations, Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts" dated September 2006 (M&E Asbestos Report). SHA has not independently verified the accuracy or completeness of the data presented in M&E's Asbestos Report. Therefore, accuracy of the data presented on this figure will be contingent on its validity. M&E's Asbestos Report remains the sole responsibility of M&E.

3. Refer to Figures 2 and 4 for additional notes and legend.

LEGEND:

M-5.5 ▲ METCALF & EDDY SAMPLE LOCATION / DESIGNATION

ND ASBESTOS NOT DETECTED IN SAMPLE ABOVE THE ANALYTICAL REPORTING LIMIT

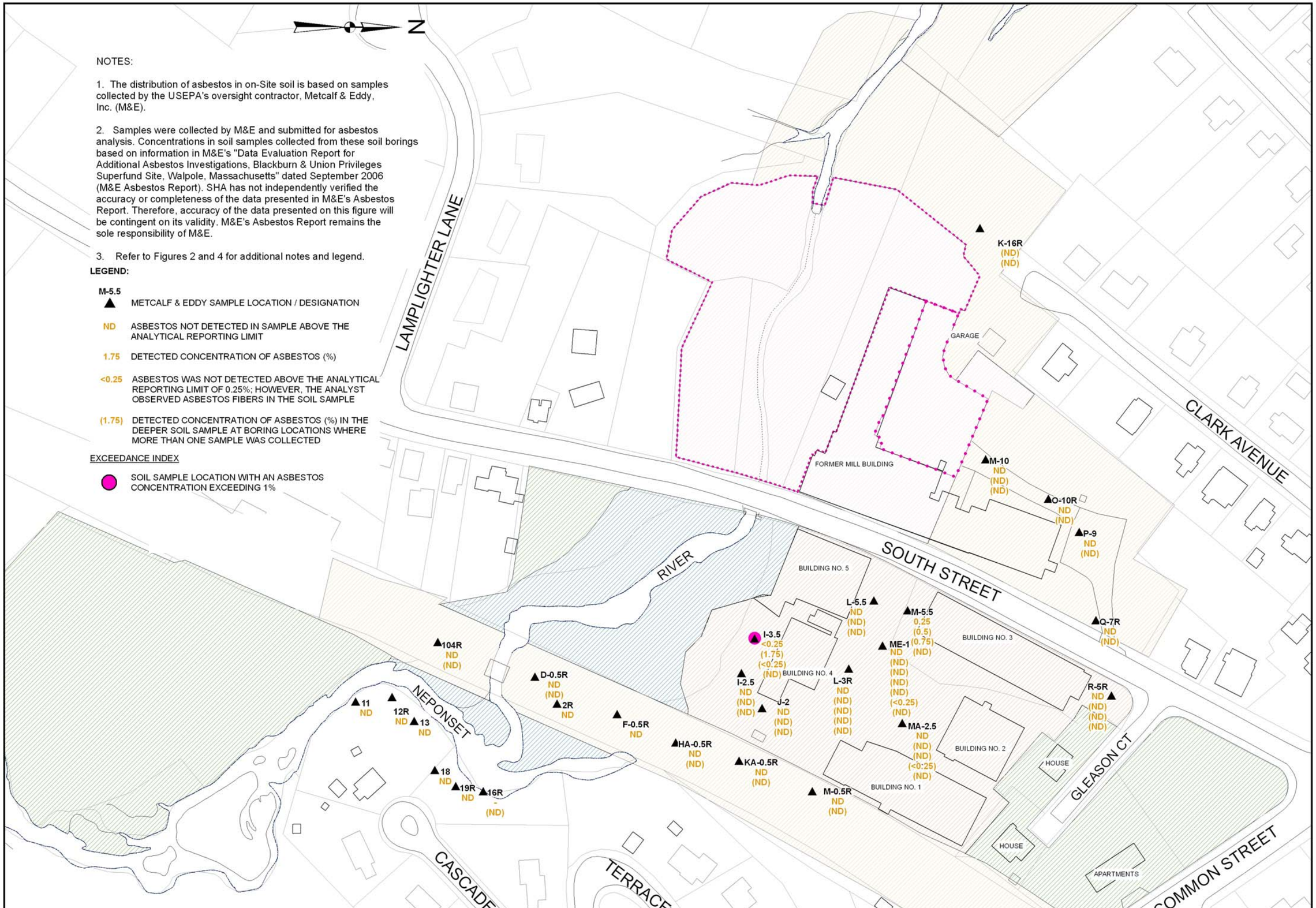
1.75 DETECTED CONCENTRATION OF ASBESTOS (%)

<0.25 ASBESTOS WAS NOT DETECTED ABOVE THE ANALYTICAL REPORTING LIMIT OF 0.25%; HOWEVER, THE ANALYST OBSERVED ASBESTOS FIBERS IN THE SOIL SAMPLE

(1.75) DETECTED CONCENTRATION OF ASBESTOS (%) IN THE DEEPER SOIL SAMPLE AT BORING LOCATIONS WHERE MORE THAN ONE SAMPLE WAS COLLECTED

EXCEEDANCE INDEX

● SOIL SAMPLE LOCATION WITH AN ASBESTOS CONCENTRATION EXCEEDING 1%



NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF ASBESTOS IN SOILS ON-SITE SOIL AS OBSERVED BY METCALF & EDDY

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 17

Notes:

1. Up to four rounds of groundwater pH measurements are presented on this figure. Groundwater samples were collected by SHA in September 2001, May 2002, October/November 2003, and September 2006. At each location, a stabilized pH measurement was recorded using a Yellow Springs Instrument, Inc. (YSI) Model 600 XLM or 560 MPS handheld field meter during low flow groundwater sampling in accordance with the standard operating procedures (SOP) for groundwater sampling (SOP-1669F) outlined in the Quality Assurance Project Plan (QAPP). Results are presented in standard units (s.u.).

2. Up to four rounds of surface water pH measurements are presented on this figure. Surface water samples were collected by SHA in March 2001, April 2001, August 2001, and September 2006. At each location, a stabilized pH measurement was recorded using a Yellow Springs Instrument, Inc. (YSI) Model 600 XLM or 560 MPS handheld field meter during surface water sampling in accordance with the standard operating procedures (SOP) for surface water sampling (SOP-1669G) outlined in the QAPP. Results are presented in s.u.

3. The pH isopleths presented on this figure are reflective of the 2006 groundwater and surface water pH measurements, or where samples were not collected during 2006, the most recent previous groundwater or surface water pH measurement. The pH isopleths were developed using generally accepted hydrogeologic practices and are intended to depict inferred trends in pH concentrations consistent with available information. Actual conditions may vary from those shown and other interpretations are possible.

4. Refer to Figures 2 through 5 for additional notes and legend.

LEGEND:

SH-01S — GROUNDWATER MONITORING WELL LOCATION / DESIGNATION

WP-02 — WELL POINT LOCATION / DESIGNATION

SW-108 — SURFACE WATER SAMPLE LOCATION / DESIGNATION

SWR-3 — SURFACE WATER REFERENCE SAMPLE LOCATION / DESIGNATION

GROUNDWATER:

5.9 / 5.9 / NS / 4.7 — OBSERVED pH (S.U.) OF GROUNDWATER SAMPLES

2001 / 2002 / 2003 / 2006 — YEAR COLLECTED

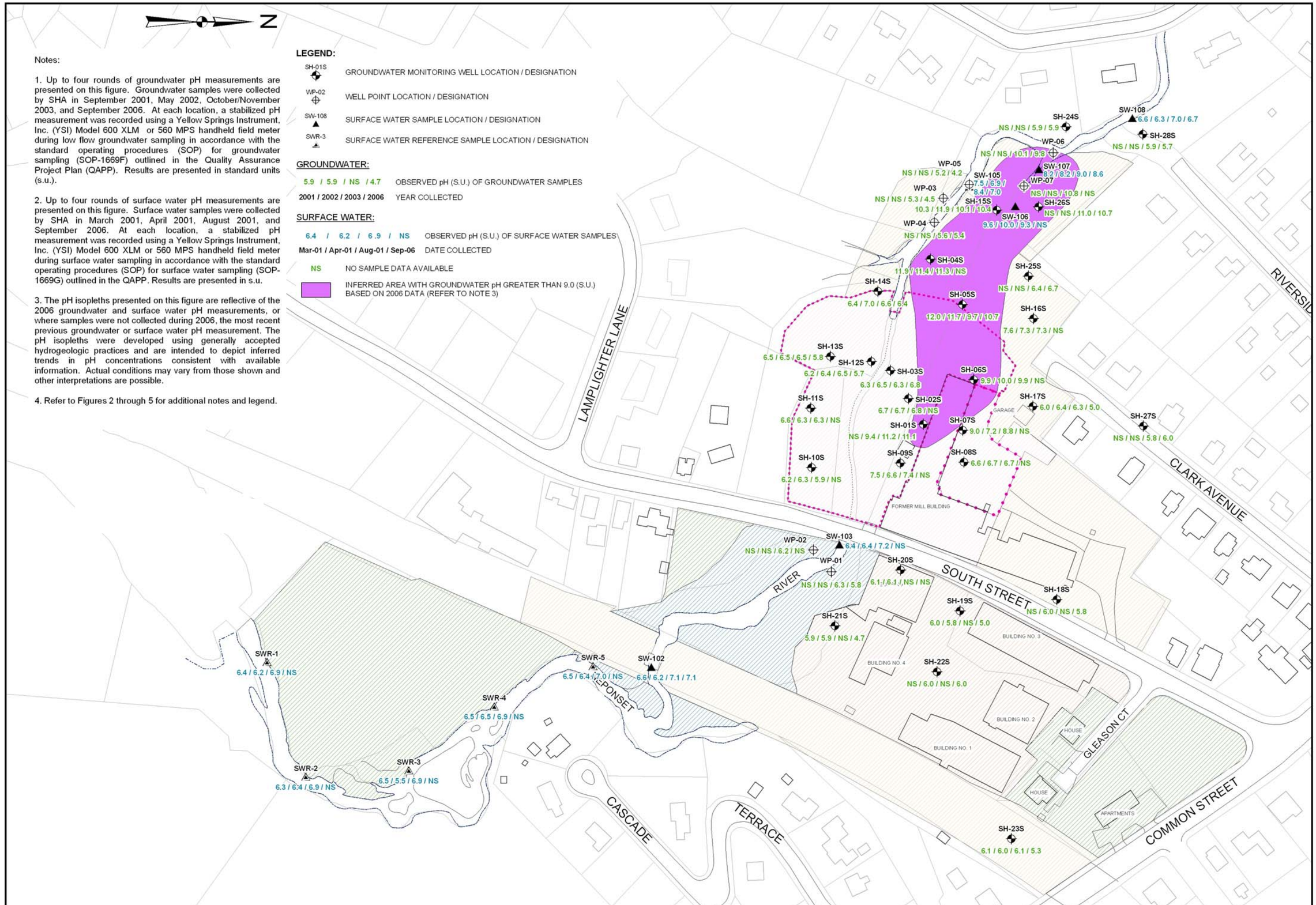
SURFACE WATER:

6.4 / 6.2 / 6.9 / NS — OBSERVED pH (S.U.) OF SURFACE WATER SAMPLES

Mar-01 / Apr-01 / Aug-01 / Sep-06 — DATE COLLECTED

NS — NO SAMPLE DATA AVAILABLE

INFERRED AREA WITH GROUNDWATER pH GREATER THAN 9.0 (S.U.) BASED ON 2006 DATA (REFER TO NOTE 3)



NO.	DATE	DESCRIPTION	BY

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF pH IN SHALLOW GROUNDWATER AND SURFACE WATER

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 18

Notes:

1. Up to four rounds of groundwater pH measurements are presented on this figure. Groundwater samples were collected by SHA in September 2001, May 2002, October/November 2003, and September 2006. At each location, a stabilized pH measurement was recorded using a Yellow Springs Instrument, Inc. (YSI) Model 600 XLM or 560 MPS handheld field meter during low flow groundwater sampling in accordance with the standard operating procedures (SOP) for groundwater sampling (SOP-1669F) outlined in the Quality Assurance Project Plan (QAPP). Results are presented in standard units (s.u.).

2. The pH isopleths presented on this figure are reflective of the 2006 groundwater pH measurements, or where samples were not collected during 2006, the most recent previous groundwater pH measurement. The pH isopleths were developed using generally accepted hydrogeologic practices and are intended to depict inferred trends in pH concentrations consistent with available information. Actual conditions may vary from those shown and other interpretations are possible.

3. "*" indicates sampling of SH-02D in 2003 indicated that pH value was approximately 6.6 s.u. A review of historical data for SH-02D (from 2001 and 2002) suggests that this is an anomalously low measurement relative to previous sampling rounds. In addition, the pumping duration of the 2003 sampling round was significantly shorter than the previous rounds, despite stabilization of field parameters. Therefore, we believe that the data collected from the 2001 and 2002 sampling round are more reliable than the data collected from the 2003 sampling round at the SH-02D monitoring well. Hence, our pH isopleths in the vicinity of SH-02D are based on the 2001 and 2002 groundwater data.

4. Refer to Figures 2 through 5 for additional notes and legend.

LEGEND:

SH-03D — GROUNDWATER MONITORING WELL LOCATION / DESIGNATION

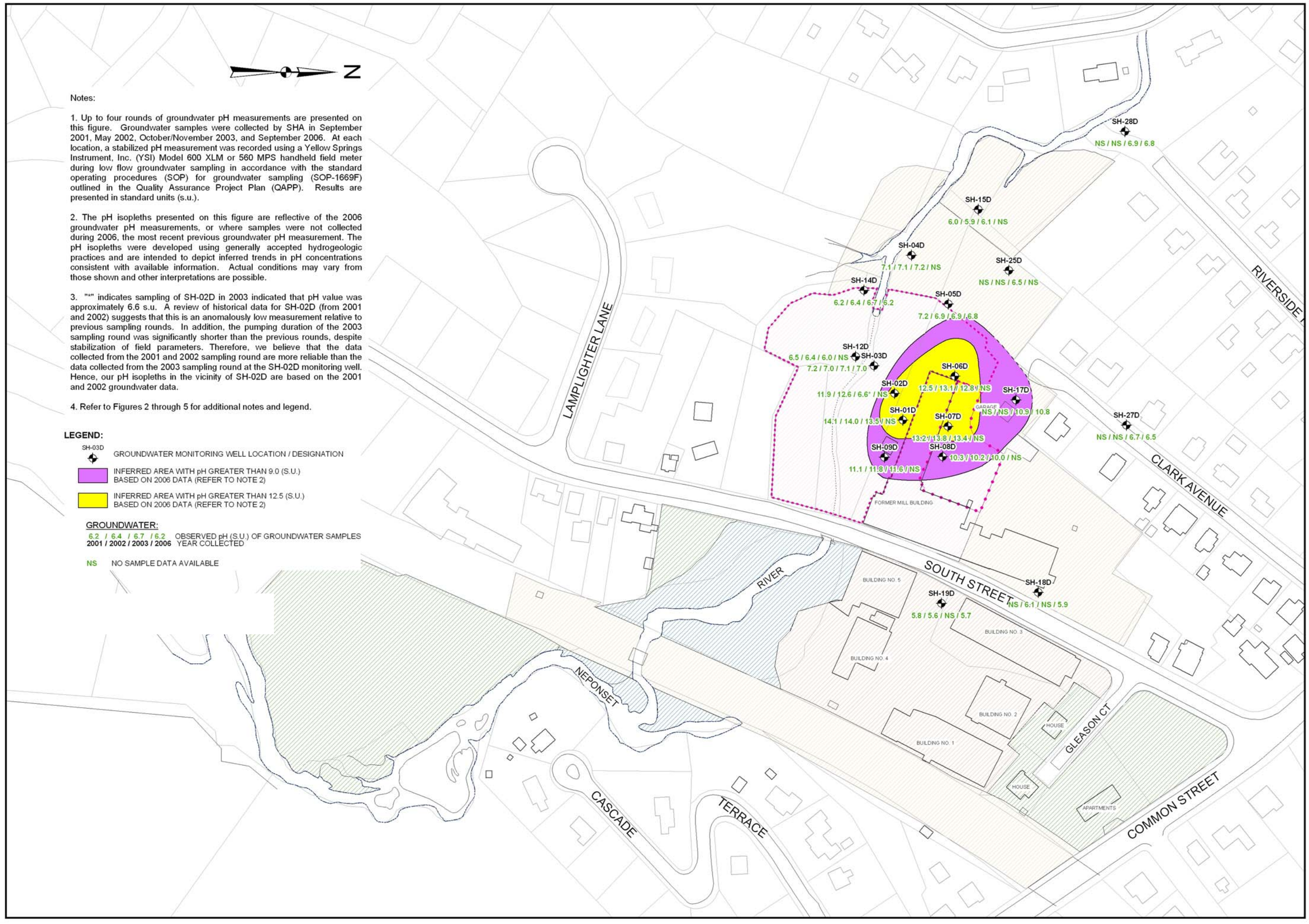
INFERRED AREA WITH pH GREATER THAN 9.0 (S.U.) BASED ON 2006 DATA (REFER TO NOTE 2)

INFERRED AREA WITH pH GREATER THAN 12.5 (S.U.) BASED ON 2006 DATA (REFER TO NOTE 2)

GROUNDWATER:

6.2 / 6.4 / 6.7 / 6.2 — OBSERVED pH (S.U.) OF GROUNDWATER SAMPLES
2001 / 2002 / 2003 / 2006 — YEAR COLLECTED

NS — NO SAMPLE DATA AVAILABLE



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE — Feet: 80, 0, 80, 160, 240

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF pH IN DEEP GROUNDWATER

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 19

Notes:

1. Up to four rounds of groundwater pH measurements are presented on this figure. Groundwater samples were collected by SHA in September 2001, May 2002, October/November 2003, and September 2006. At each location, a stabilized pH measurement was recorded using a Yellow Springs Instrument, Inc. (YSI) Model 600 XLM or 560 MPS handheld field meter during low flow groundwater sampling in accordance with the standard operating procedures (SOP) for groundwater sampling (SOP-1669F) outlined in the Quality Assurance Project Plan (QAPP). Results are presented in standard units (s.u.).

2. The pH isopleths presented on this figure are reflective of the 2006 groundwater pH measurements, or where samples were not collected during 2006, the most recent previous groundwater pH measurement. The pH isopleths were developed using generally accepted hydrogeologic practices and are intended to depict inferred trends in pH concentrations consistent with available information. Actual conditions may vary from those shown and other interpretations are possible.

3. Refer to Figures 2 through 5 for additional notes and legend.

LEGEND:

SH-02R — GROUNDWATER MONITORING WELL LOCATION / DESIGNATION

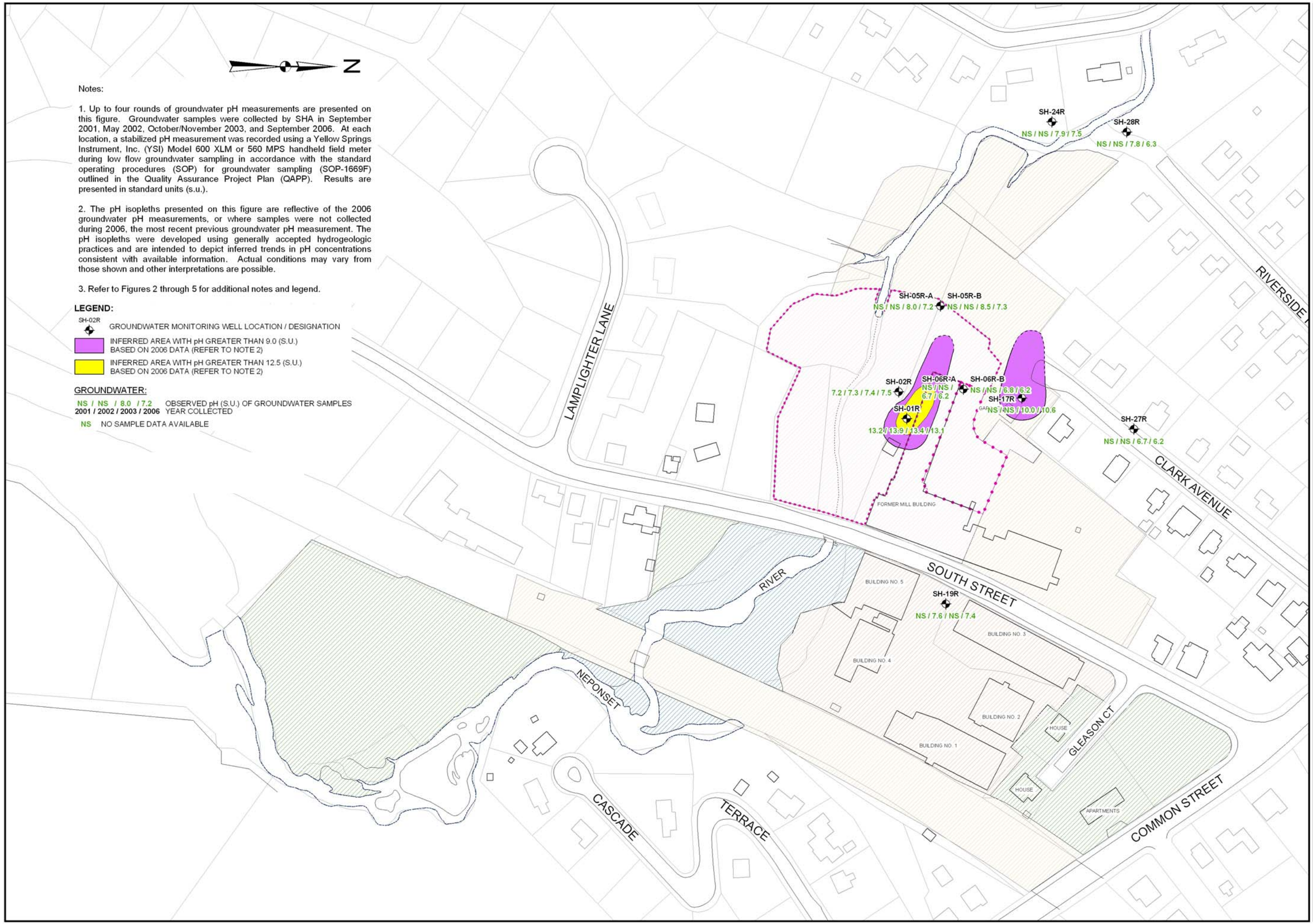
INFERRED AREA WITH pH GREATER THAN 9.0 (S.U.) BASED ON 2006 DATA (REFER TO NOTE 2)

INFERRED AREA WITH pH GREATER THAN 12.5 (S.U.) BASED ON 2006 DATA (REFER TO NOTE 2)

GROUNDWATER:

NS / NS / 8.0 / 7.2 — OBSERVED pH (S.U.) OF GROUNDWATER SAMPLES
2001 / 2002 / 2003 / 2006 — YEAR COLLECTED

NS — NO SAMPLE DATA AVAILABLE



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
80 0 80 160 240

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF pH IN BEDROCK GROUNDWATER

PROJECT NUMBER
2032.01

FIGURE NUMBER
20

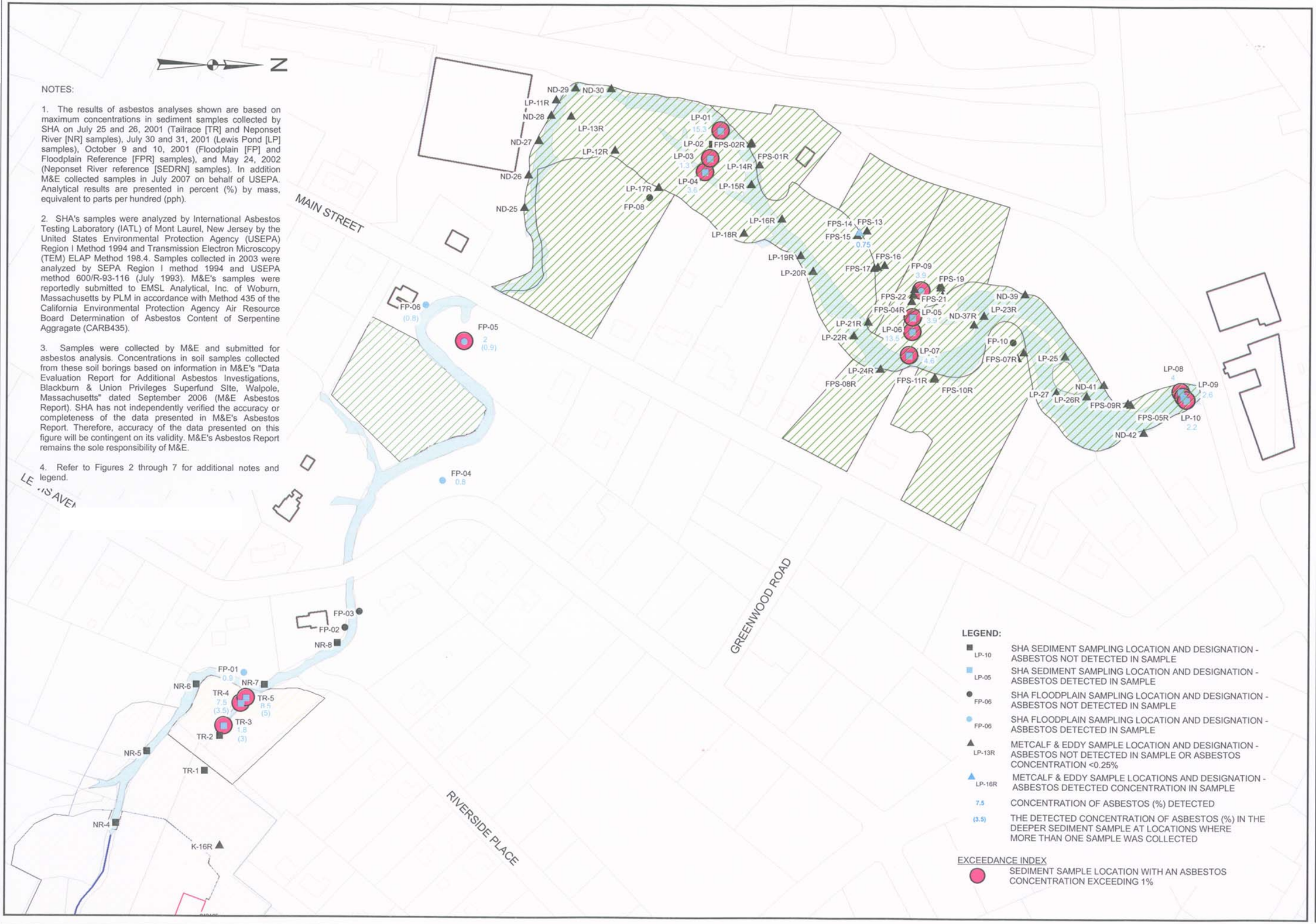
NOTES:

1. The results of asbestos analyses shown are based on maximum concentrations in sediment samples collected by SHA on July 25 and 26, 2001 (Tailrace [TR] and Neponset River [NR] samples), July 30 and 31, 2001 (Lewis Pond [LP] samples), October 9 and 10, 2001 (Floodplain [FP] and Floodplain Reference [FPR] samples), and May 24, 2002 (Neponset River reference [SEDRN] samples). In addition M&E collected samples in July 2007 on behalf of USEPA. Analytical results are presented in percent (%) by mass, equivalent to parts per hundred (pph).

2. SHA's samples were analyzed by International Asbestos Testing Laboratory (IATL) of Mont Laurel, New Jersey by the United States Environmental Protection Agency (USEPA) Region I Method 1994 and Transmission Electron Microscopy (TEM) ELAP Method 198.4. Samples collected in 2003 were analyzed by SEPA Region I method 1994 and USEPA method 600/R-93-116 (July 1993). M&E's samples were reportedly submitted to EMSL Analytical, Inc. of Woburn, Massachusetts by PLM in accordance with Method 435 of the California Environmental Protection Agency Air Resource Board Determination of Asbestos Content of Serpentine Aggragate (CARB435).

3. Samples were collected by M&E and submitted for asbestos analysis. Concentrations in soil samples collected from these soil borings based on information in M&E's "Data Evaluation Report for Additional Asbestos Investigations, Blackburn & Union Privileges Superfund Site, Walpole, Massachusetts" dated September 2006 (M&E Asbestos Report). SHA has not independently verified the accuracy or completeness of the data presented in M&E's Asbestos Report. Therefore, accuracy of the data presented on this figure will be contingent on its validity. M&E's Asbestos Report remains the sole responsibility of M&E.

4. Refer to Figures 2 through 7 for additional notes and legend.



LEGEND:

■ LP-10	SHA SEDIMENT SAMPLING LOCATION AND DESIGNATION - ASBESTOS NOT DETECTED IN SAMPLE
■ LP-05	SHA SEDIMENT SAMPLING LOCATION AND DESIGNATION - ASBESTOS DETECTED IN SAMPLE
● FP-06	SHA FLOODPLAIN SAMPLING LOCATION AND DESIGNATION - ASBESTOS NOT DETECTED IN SAMPLE
● FP-06	SHA FLOODPLAIN SAMPLING LOCATION AND DESIGNATION - ASBESTOS DETECTED IN SAMPLE
▲ LP-13R	METCALF & EDDY SAMPLE LOCATION AND DESIGNATION - ASBESTOS NOT DETECTED IN SAMPLE OR ASBESTOS CONCENTRATION <0.25%
▲ LP-16R	METCALF & EDDY SAMPLE LOCATIONS AND DESIGNATION - ASBESTOS DETECTED CONCENTRATION IN SAMPLE
7.5	CONCENTRATION OF ASBESTOS (%) DETECTED
(3.5)	THE DETECTED CONCENTRATION OF ASBESTOS (%) IN THE DEEPER SEDIMENT SAMPLE AT LOCATIONS WHERE MORE THAN ONE SAMPLE WAS COLLECTED

EXCEEDANCE INDEX

● SEDIMENT SAMPLE LOCATION WITH AN ASBESTOS CONCENTRATION EXCEEDING 1%

NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
90 0 90 180 270

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

DISTRIBUTION OF ASBESTOS IN SEDIMENT SAMPLES

PROJECT NUMBER: 2032.01

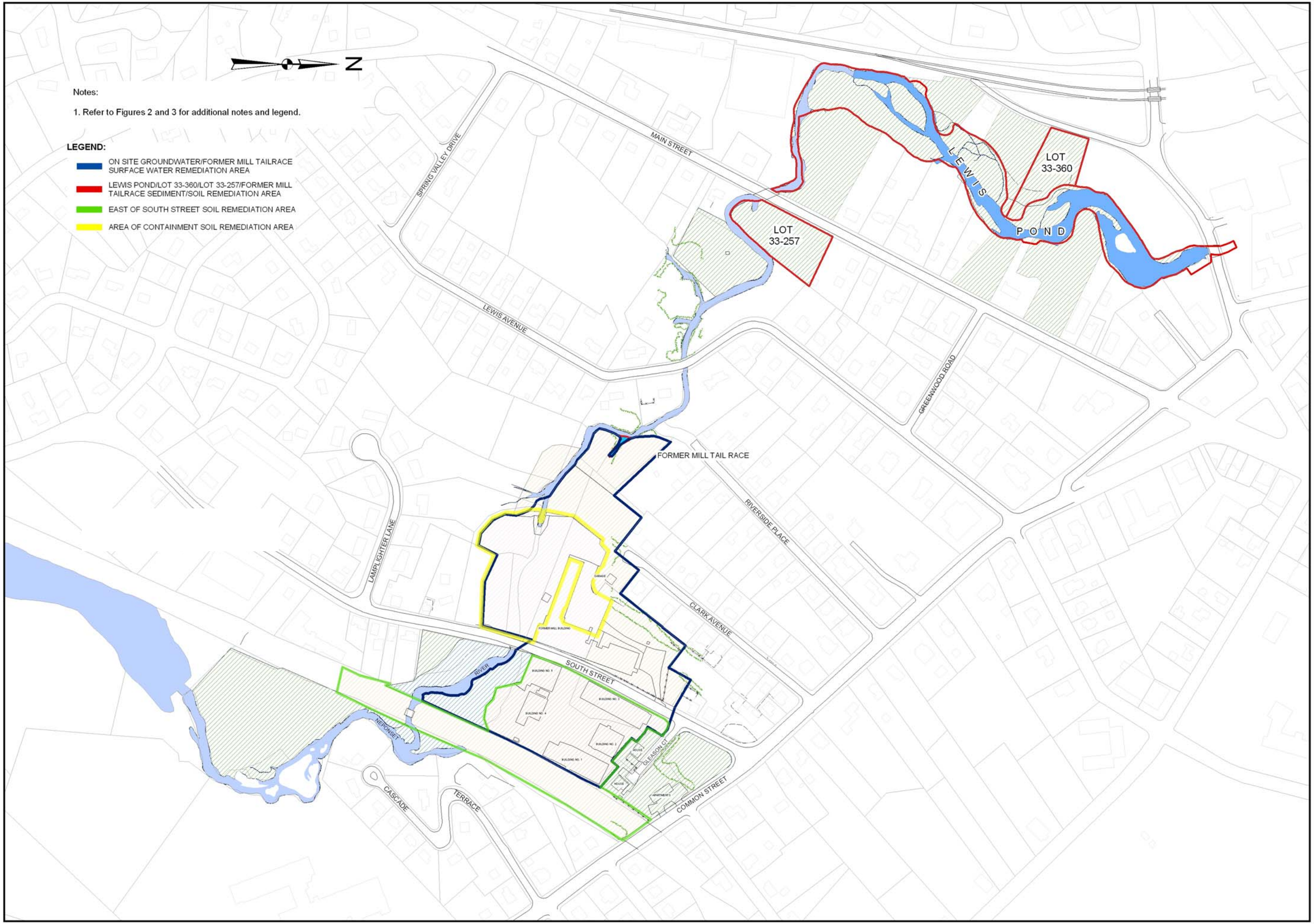
FIGURE NUMBER: 21

Notes:

1. Refer to Figures 2 and 3 for additional notes and legend.

LEGEND:

- ON SITE GROUNDWATER/FORMER MILL TAILRACE SURFACE WATER REMEDIATION AREA
- LEWIS POND/LOT 33-360/LOT 33-257/FORMER MILL TAILRACE SEDIMENT/SOIL REMEDIATION AREA
- EAST OF SOUTH STREET SOIL REMEDIATION AREA
- AREA OF CONTAINMENT SOIL REMEDIATION AREA



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE

150 75 0 150 300 450 Feet

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

REMEDIATION AREAS

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 22

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Notes:

1. The "Inferred Area with Groundwater and Surface Water COC Concentrations Greater than PRGs represents the extent of groundwater and surface water COC concentrations that exceed PRGs. Refer to section 2 and Appendix C of this Report for an explanation of the basis for these areas.

3. The areas and volumes presented on this figure were developed using generally accepted hydrologic practices and are intended to depict inferred trends in surface and subsurface conditions consistent with information gathered as part of the RI for the Site. Actual conditions may vary from those shown and other interpretations are possible.

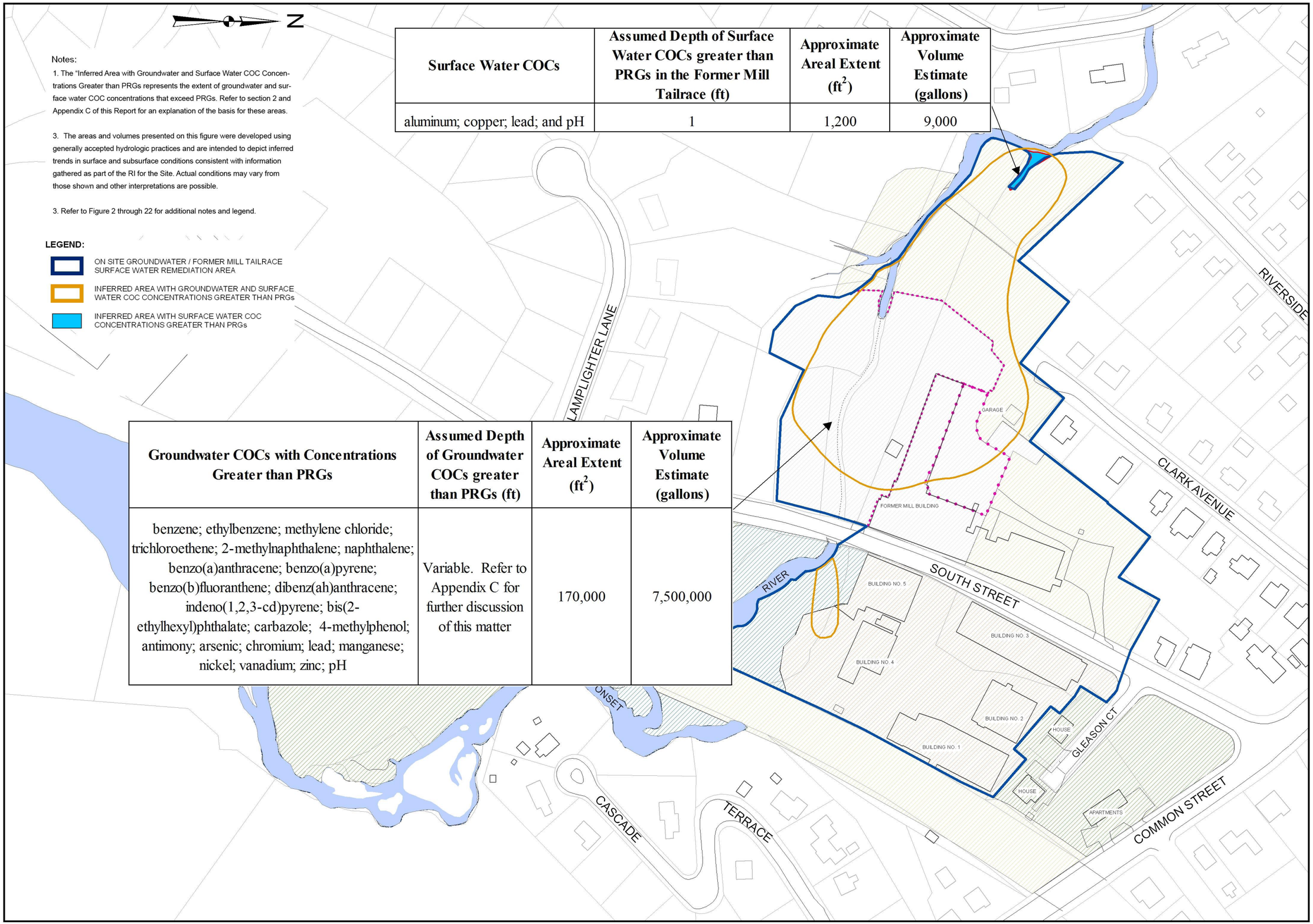
3. Refer to Figure 2 through 22 for additional notes and legend.

LEGEND:

- ON SITE GROUNDWATER / FORMER MILL TAILRACE SURFACE WATER REMEDIATION AREA
- INFERRED AREA WITH GROUNDWATER AND SURFACE WATER COC CONCENTRATIONS GREATER THAN PRGs
- INFERRED AREA WITH SURFACE WATER COC CONCENTRATIONS GREATER THAN PRGs

Surface Water COCs	Assumed Depth of Surface Water COCs greater than PRGs in the Former Mill Tailrace (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (gallons)
aluminum; copper; lead; and pH	1	1,200	9,000

Groundwater COCs with Concentrations Greater than PRGs	Assumed Depth of Groundwater COCs greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (gallons)
benzene; ethylbenzene; methylene chloride; trichloroethene; 2-methylnaphthalene; naphthalene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(ah)anthracene; indeno(1,2,3-cd)pyrene; bis(2-ethylhexyl)phthalate; carbazole; 4-methylphenol; antimony; arsenic; chromium; lead; manganese; nickel; vanadium; zinc; pH	Variable. Refer to Appendix C for further discussion of this matter	170,000	7,500,000



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
80 0 80 160 240 Feet

FIGURE ORIGINATED FROM SHA'S OCT. 2007 DRAFT FS

DRAWN BY: LAA/LJ/NCM
DESIGNED BY: LAA/LJK
CHECKED BY: BAG
REVIEWED BY: CAC
PROJECT MGR: BAG
P/C: CLH
DATE: OCT 07

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

GROUNDWATER / SURFACE WATER WITH COC CONCENTRATIONS GREATER THAN PRGs

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 23

FILE: S:\CONDATA\2000s\2032.01\Verified\Figure\FS_V01\Fig23_Groundwater_COC_Concentration_091007.mxd
PDF FILE:
PLOT DATE: 09.14.07

NOTES:

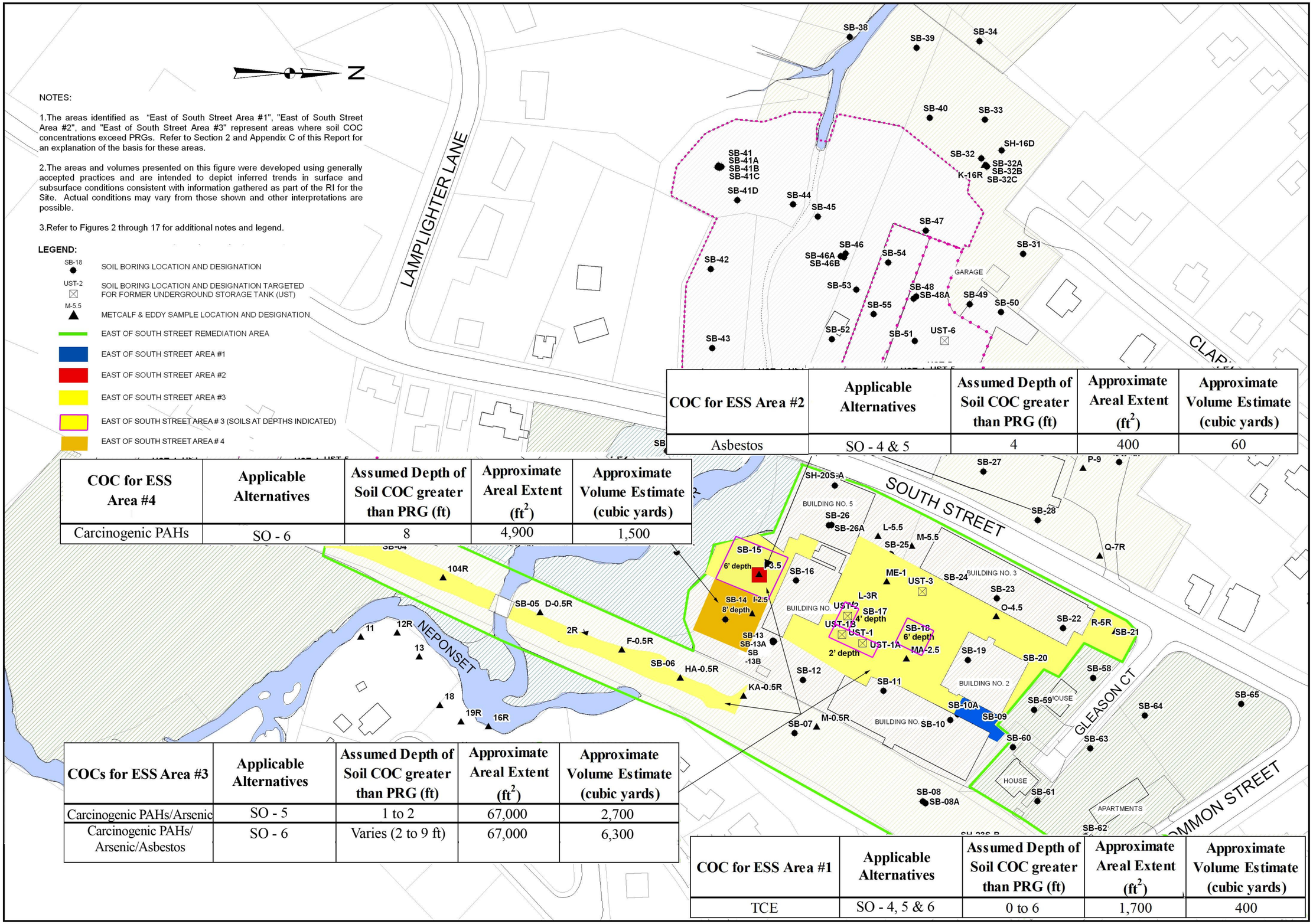
1.The areas identified as "East of South Street Area #1", "East of South Street Area #2", and "East of South Street Area #3" represent areas where soil COC concentrations exceed PRGs. Refer to Section 2 and Appendix C of this Report for an explanation of the basis for these areas.

2.The areas and volumes presented on this figure were developed using generally accepted practices and are intended to depict inferred trends in surface and subsurface conditions consistent with information gathered as part of the RI for the Site. Actual conditions may vary from those shown and other interpretations are possible.

3.Refer to Figures 2 through 17 for additional notes and legend.

LEGEND:

- SB-18 — SOIL BORING LOCATION AND DESIGNATION
- UST-2 — SOIL BORING LOCATION AND DESIGNATION TARGETED FOR FORMER UNDERGROUND STORAGE TANK (UST)
- M-5.5 — METCALF & EDDY SAMPLE LOCATION AND DESIGNATION
- EAST OF SOUTH STREET REMEDIATION AREA
- EAST OF SOUTH STREET AREA #1
- EAST OF SOUTH STREET AREA #2
- EAST OF SOUTH STREET AREA #3
- EAST OF SOUTH STREET AREA # 3 (SOILS AT DEPTHS INDICATED)
- EAST OF SOUTH STREET AREA # 4



COC for ESS Area #2	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	SO - 4 & 5	4	400	60

COC for ESS Area #4	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Carcinogenic PAHs	SO - 6	8	4,900	1,500

COCs for ESS Area #3	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Carcinogenic PAHs/Arsenic	SO - 5	1 to 2	67,000	2,700
Carcinogenic PAHs/ Arsenic/Asbestos	SO - 6	Varies (2 to 9 ft)	67,000	6,300

COC for ESS Area #1	Applicable Alternatives	Assumed Depth of Soil COC greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
TCE	SO - 4, 5 & 6	0 to 6	1,700	400

NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
60 0 60 120 180 Feet

FIGURE ORIGINATED FROM SHA'S OCT. 2007 DRAFT FS

DRAWN BY: LAA/LJR/NCM
DESIGNED BY: LAA/LJK
CHECKED BY: BAG
REVIEWED BY: CAC
PROJECT MGR: BAG
P/C: CLH
DATE: OCT 07

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SOILS IN THE EAST OF SOUTH ST. AREA WITH COC CONCENTRATIONS GREATER THAN PRGs

PROJECT NUMBER : 2032.01

FIGURE NUMBER : 24

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NOTES:

1. The Areas identified as "Soil-Capped AOC, "Asphalt-Capped AOC," and "Settling Basin #2 Containment Cell" represent areas within the Area of Containment that contain contaminated soils above the water table. Refer to section 2 and Appendix C of this Report for an explanation of the basis for these areas.

2.The areas and volumes presented on this figure were developed using generally accepted practices and are intended to depict inferred trends in surface and subsurface conditions consistent with information gathered as part of the RI for the Site. Actual conditions may vary from those shown and other interpretations are possible.

3.Refer to Figures 2 through 17 for additional notes and legend.

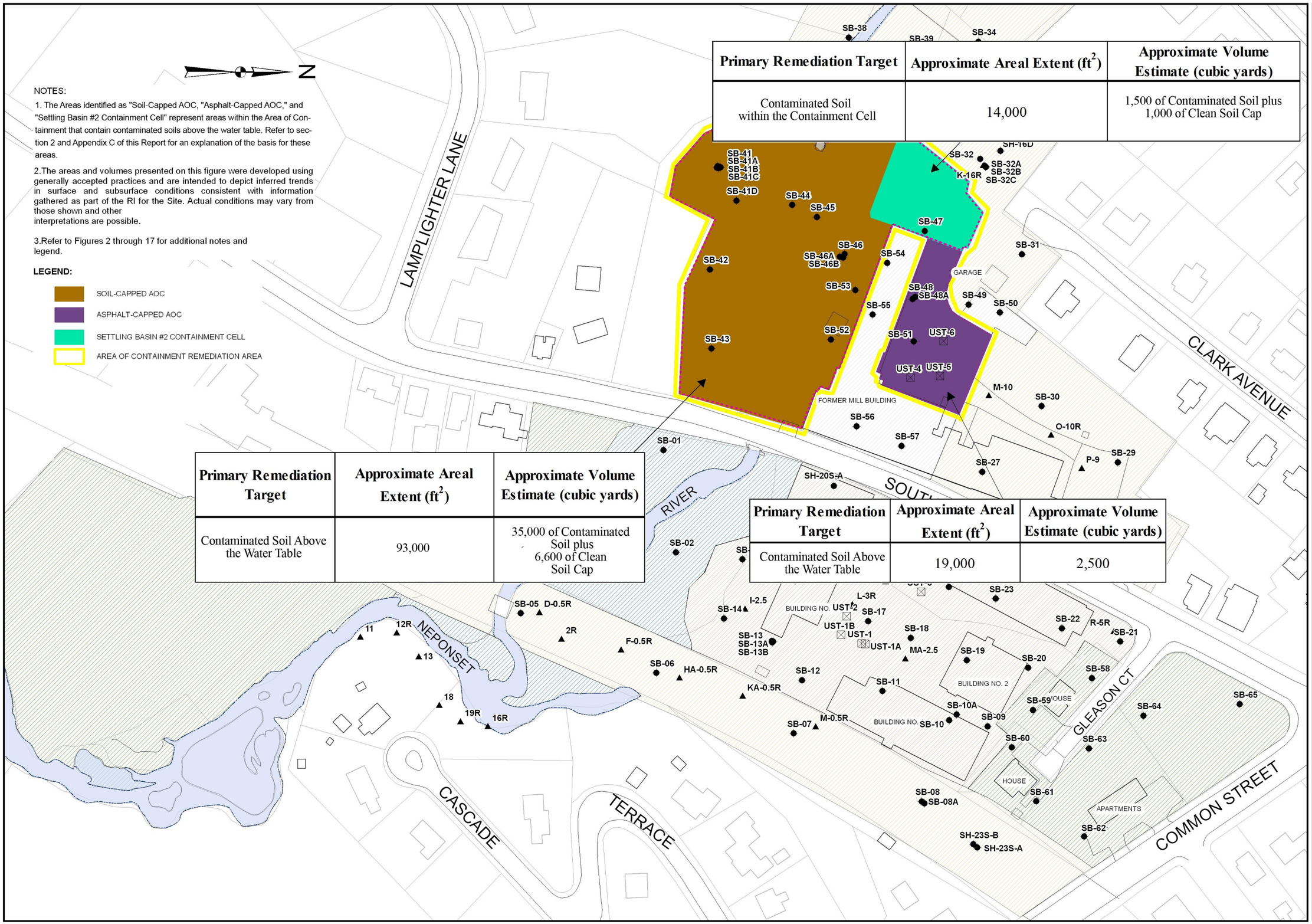
LEGEND:

- SOIL-CAPPED AOC
- ASPHALT-CAPPED AOC
- SETTLING BASIN #2 CONTAINMENT CELL
- AREA OF CONTAINMENT REMEDIATION AREA

Primary Remediation Target	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Contaminated Soil within the Containment Cell	14,000	1,500 of Contaminated Soil plus 1,000 of Clean Soil Cap

Primary Remediation Target	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Contaminated Soil Above the Water Table	93,000	35,000 of Contaminated Soil plus 6,600 of Clean Soil Cap

Primary Remediation Target	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Contaminated Soil Above the Water Table	19,000	2,500



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet
60 0 60 120 180

FIGURE ORIGINATED FROM SHA'S OCT. 2007 DRAFT FS

DRAWN BY: LAA/LJK/NCM
DESIGNED BY: LAA/LJK
CHECKED BY: BAG
REVIEWED BY: CAC
PROJECT MGR: BAG
P/C: CLH
DATE: OCT 07

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

CONTAMINATED SOILS IN THE AOC

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 25

FILE: S:\CONDAT\2000s\2032.01\Vertical\Figures\FS_V01\FIg25_FS_Soils_AOC_091107.mxd
PDF FILE:
PLOT DATE: 09-14-07

NOTES:

1.The areas identified as "Lewis Pond Area #1", "Lewis Pond Area #2", "Lewis Pond Area #3", "Lot 33-360 Area", "Lot 33-257 Area" and "Former Mill Tail Race" represent areas within the Lewis Pond / Lot 33-360 / Lot 33-257 / Former Mill Tailrace Remediation Area that contain soil or sediment with COC concentrations greater than their PRGs. Refer to Section 2 and Appendix C of this Report for an explanation of the basis for these areas.

2.The areas and volumes depicted on this figure were developed using generally accepted practices and are intended to depict inferred trends in surface or subsurface conditions consistent with information gathered as part of the RI for the Site. Actual conditions may vary from those shown and other interpretations are possible.

3.Refer to Figures 2 through 22 for additional notes and legend.

COC for Lewis Pond Area #1	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	2	22,000	1,700

COC for Lot 33-360	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	1	4,400	200

COC for Lewis Pond Area #2	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Arial Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	2	15,000	1,200

COC(s) for Lot 33-257	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos/Lead	1	17,000	600

COC for Lewis Pond Area #3	Assumed Depth of Sediment with COC Concentrations greater than PRGs (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	2	9,400	700

COC for Former Mill Tailrace Sediment	Assumed Depth of Sediment with COC Concentration greater than PRG (ft)	Approximate Areal Extent (ft^2)	Approximate Volume Estimate (cubic yards)
Asbestos	1	1,200	500

LEGEND:

- LEWIS POND / LOT 33-360 / LOT 33-257/ FORMER MILL TAILRACE REMEDIATION AREA
- LEWIS POND AREA #1
- LEWIS POND AREA #2
- LEWIS POND AREA #3
- LOT #33-360 AREA
- LOT #33-257 AREA
- FORMER MILL TAILRACE

GRAPHICAL SCALE: Feet 90 0 90 180 270

FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

LEWIS POND / LOT 33-360 / LOT 33-257 / FORMER MILL TAIL RACE REMEDIATION AREA

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 26

Notes:

1. Concentrations of groundwater COCs outside of the Contaminated Media Area Groundwater Compliance Boundary are required to be below their respective PRGs.

2. The proposed locations and sizes of remedial structures depicted on this figure such as the groundwater collection trench, groundwater treatment system building, subsurface piping, surface water discharge area, should be considered approximate only. Pre-design studies will determine the actual size and location of these features if they are selected as part of the remedy for the Site.

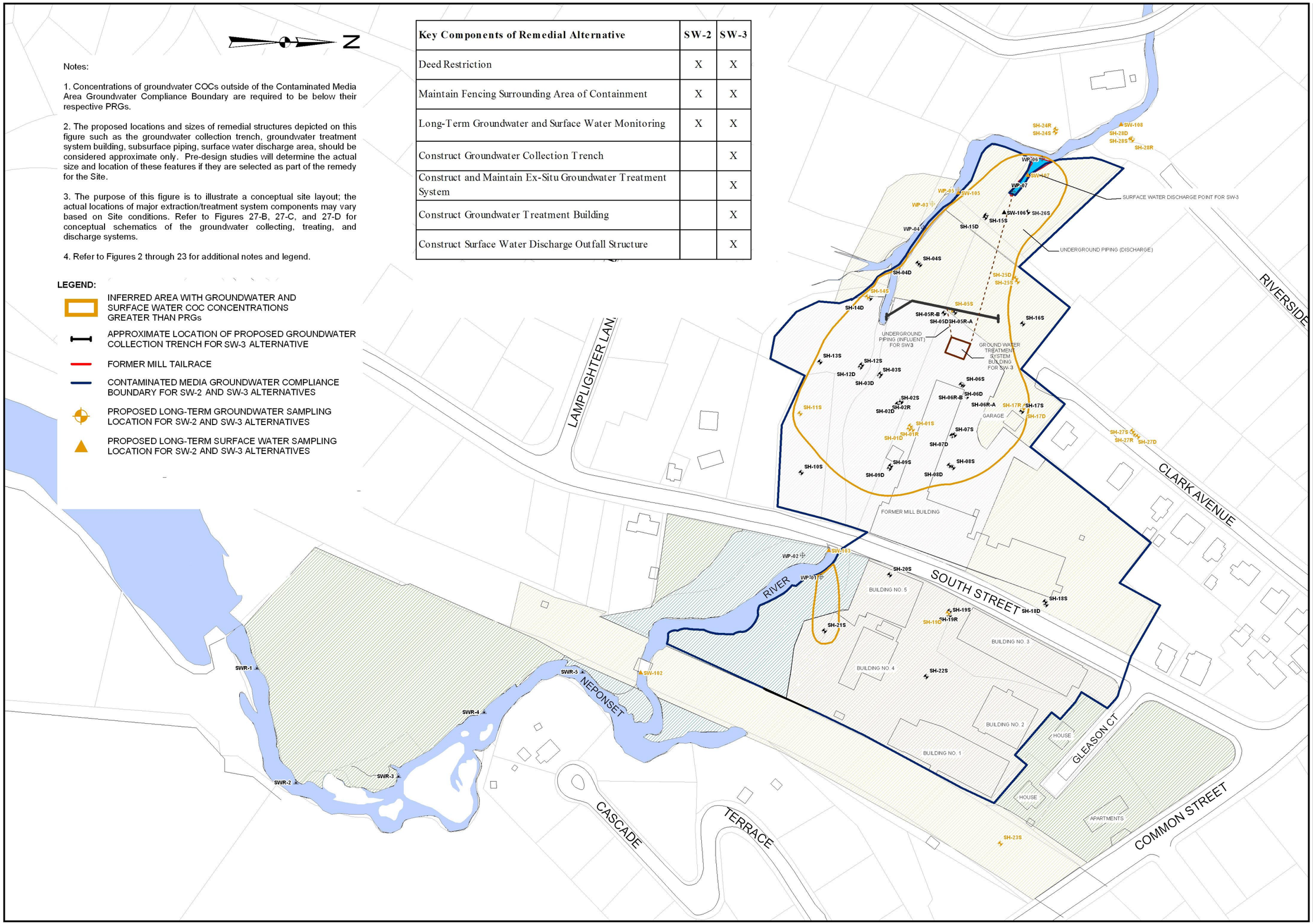
3. The purpose of this figure is to illustrate a conceptual site layout; the actual locations of major extraction/treatment system components may vary based on Site conditions. Refer to Figures 27-B, 27-C, and 27-D for conceptual schematics of the groundwater collecting, treating, and discharge systems.

4. Refer to Figures 2 through 23 for additional notes and legend.

LEGEND:

- INFERRED AREA WITH GROUNDWATER AND SURFACE WATER COC CONCENTRATIONS GREATER THAN PRGs
- APPROXIMATE LOCATION OF PROPOSED GROUNDWATER COLLECTION TRENCH FOR SW-3 ALTERNATIVE
- FORMER MILL TAILRACE
- CONTAMINATED MEDIA GROUNDWATER COMPLIANCE BOUNDARY FOR SW-2 AND SW-3 ALTERNATIVES
- PROPOSED LONG-TERM GROUNDWATER SAMPLING LOCATION FOR SW-2 AND SW-3 ALTERNATIVES
- PROPOSED LONG-TERM SURFACE WATER SAMPLING LOCATION FOR SW-2 AND SW-3 ALTERNATIVES

Key Components of Remedial Alternative	SW-2	SW-3
Deed Restriction	X	X
Maintain Fencing Surrounding Area of Containment	X	X
Long-Term Groundwater and Surface Water Monitoring	X	X
Construct Groundwater Collection Trench		X
Construct and Maintain Ex-Situ Groundwater Treatment System		X
Construct Groundwater Treatment Building		X
Construct Surface Water Discharge Outfall Structure		X



NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
Feet 240 160 80 0 80

FIGURE ORIGINATED FROM SHA'S OCT. 2007 DRAFT FS

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DESIGNED BY: LAA/LJK
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P/C: CLH
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BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SW-2 THROUGH SW-3 ALTERNATIVES

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 27-A

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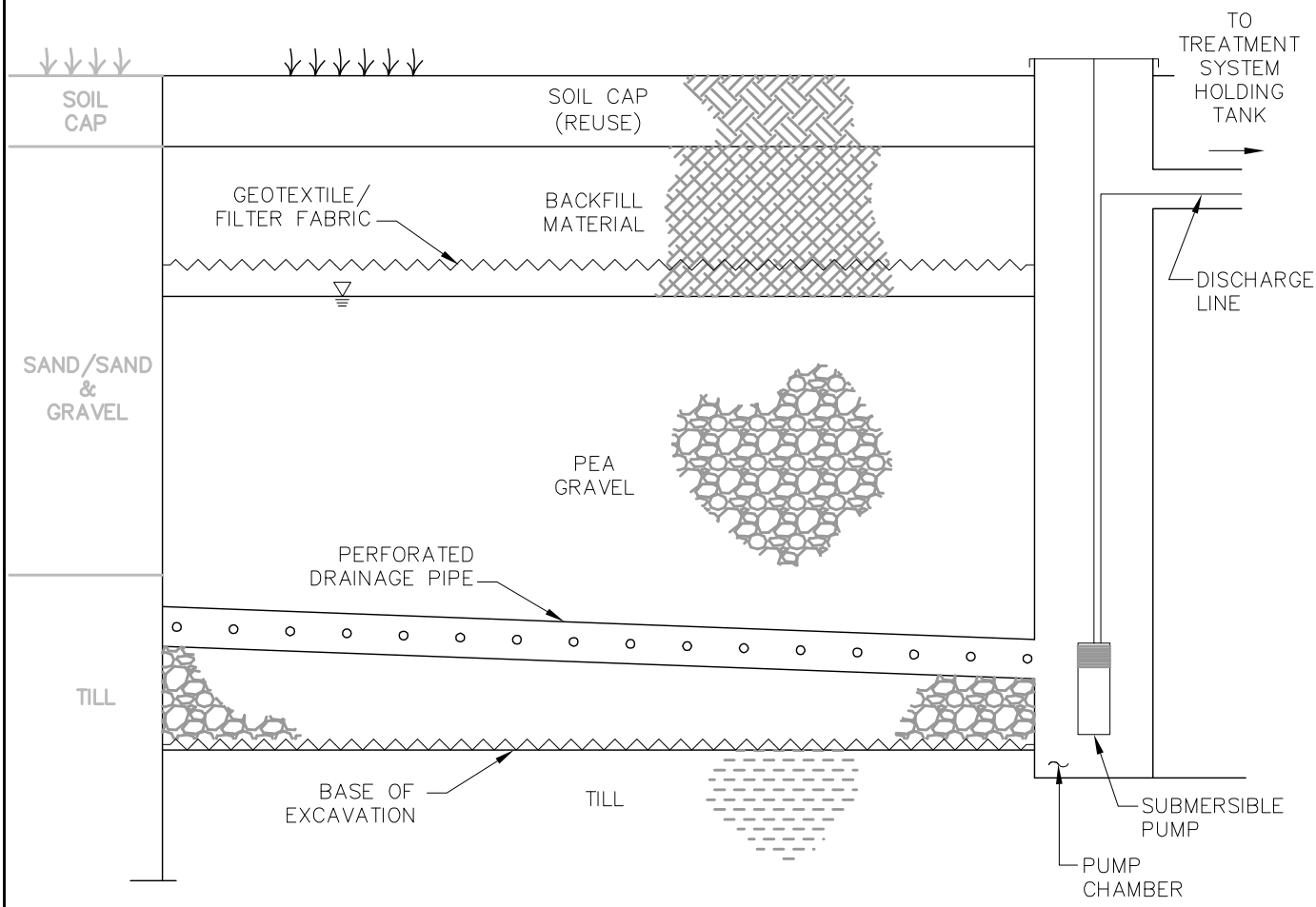
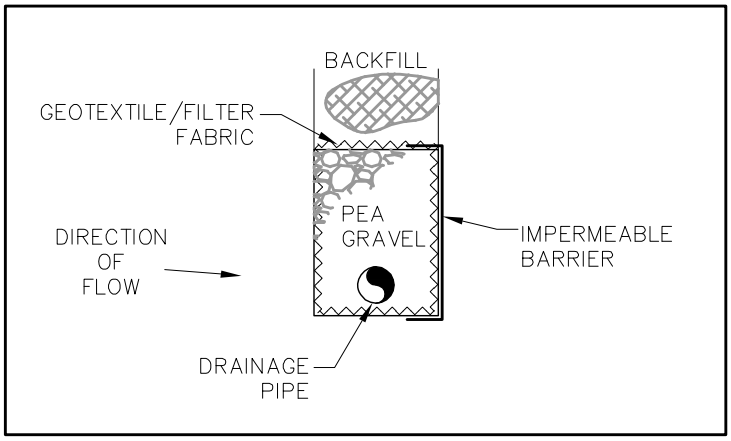
FILE: S:\CADDATA\2006\2032.01\Workfiles\Figures\FS_V1\FFig27-A_SW_Alternative GW-SW_Remediation_Area.mxd
PDF FILE:
PLOT DATE: 09-14-07





DETAIL

NOTES:

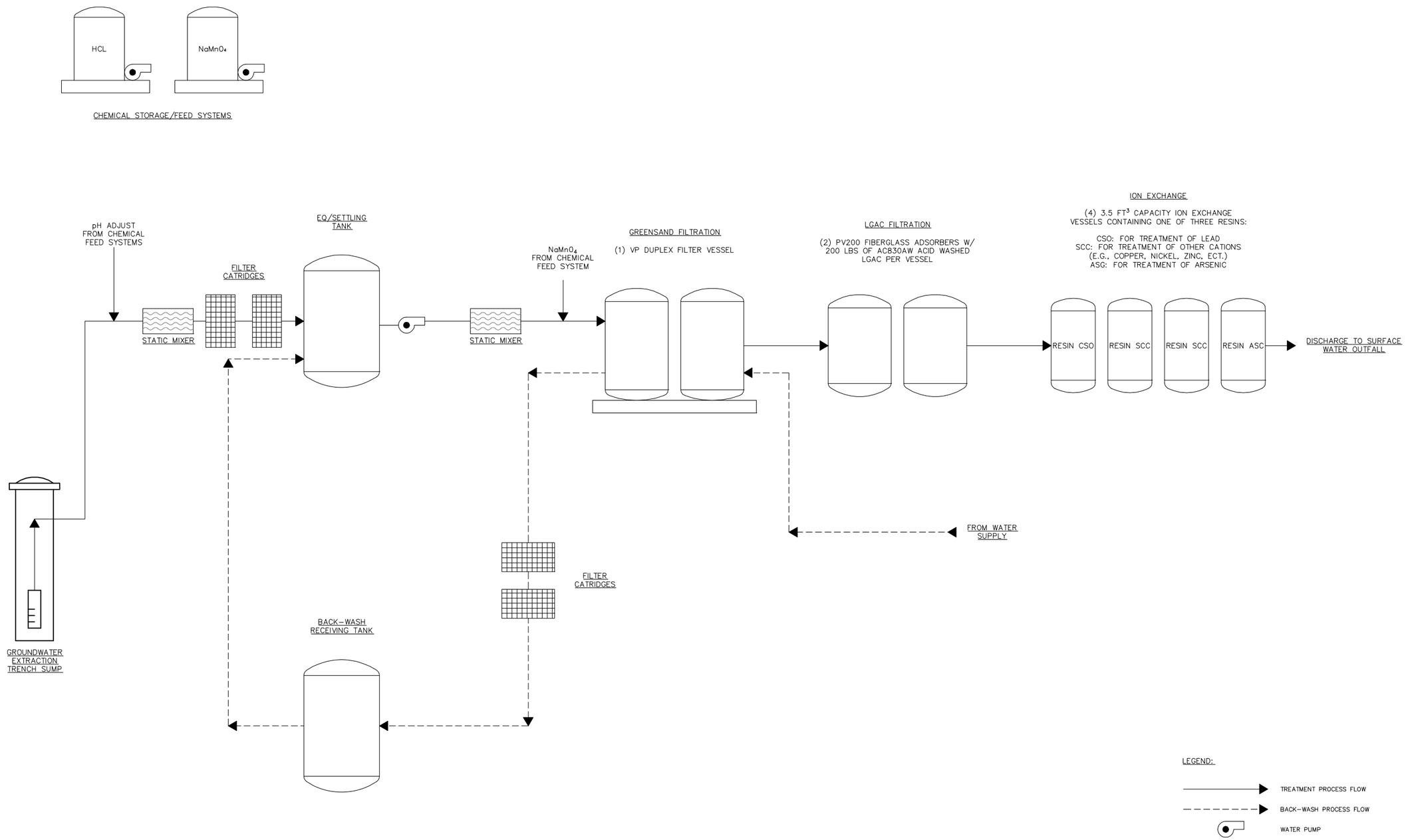
1. THIS FIGURE IS INTENDED TO ILLUSTRATE THE CONCEPTUAL DESIGN OF A GROUNDWATER EXTRACTION TRENCH SYSTEM; SYSTEM COMPONENTS AND/OR CONFIGURATION MAY VARY BASED ON ACTUAL SITE CONDITIONS.

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE WALPOLE, MASSACHUSETTS	SCHEMATIC OF GROUNDWATER INTERCEPTOR TRENCH DESIGN	
	SCALE: NTS	FILE NO.2032.01
	DATE: SEP 07	FIGURE NO. 27B

NOTES:

1. THIS FIGURE PRESENTS A PRELIMINARY-DESIGN PROCESS FLOW DIAGRAM FOR THE PROPOSED GROUNDWATER TREATMENT SYSTEM. NOT ALL REQUIRED COMPONENTS ARE SHOWN, AND FINAL DESIGN MAY INCLUDE VERIATIONS/ALTERATIONS.

2. THIS FIGURE DOES NOT INCLUDE DESIGN INFORMATION THAT IS SUITABLE FOR CONSTRUCTION PURPOSED.



NO.	DATE	DESCRIPTION	BY

NOT TO SCALE

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

PROCESS FLOW DIAGRAM FOR GROUNDWATER EXTRACTION PUMP & TREATMENT SYSTEM (ALTERNATIVE SW-3)

PROJECT NUMBER: 2032.01

SHEET NUMBER: 27C

NOTES:

1. THIS FIGURE IS INTENDED TO ILLUSTRATE THE CONCEPTUAL DESIGN OF A SURFACE WATER OUTFALL SYSTEM; SYSTEM COMPONENTS AND/OR CONFIGURATION MAY VARY BASED ON ACTUAL SITE CONDITIONS.

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SCHEMATIC OF SURFACEWATER OUTFALL FOR GROUNDWATER TREATMENT SYSTEM

SCALE: NTS

DATE: SEP 07

FILE NO.2032.01

FIGURE NO. 27D

Notes:

1. The area designated "Paved Portion of the East of South Street Remediation Area" represents those portions of the East of South Street Remediation Area that are currently paved. This area was not surveyed by SHA or SHA's subcontractor; therefor, it should be considered approximate only.

2. Remedial Alternatives SO-2 through SO-4 address soil COCs that exceed PRGs for a Site Worker redevelopment scenario. Remedial Alternative SO-5 addresses COCs that exceed PRGs for Daycare Child redevelopment scenario. Refer to the text of this report for further discussion of potential redevelopment scenarios.

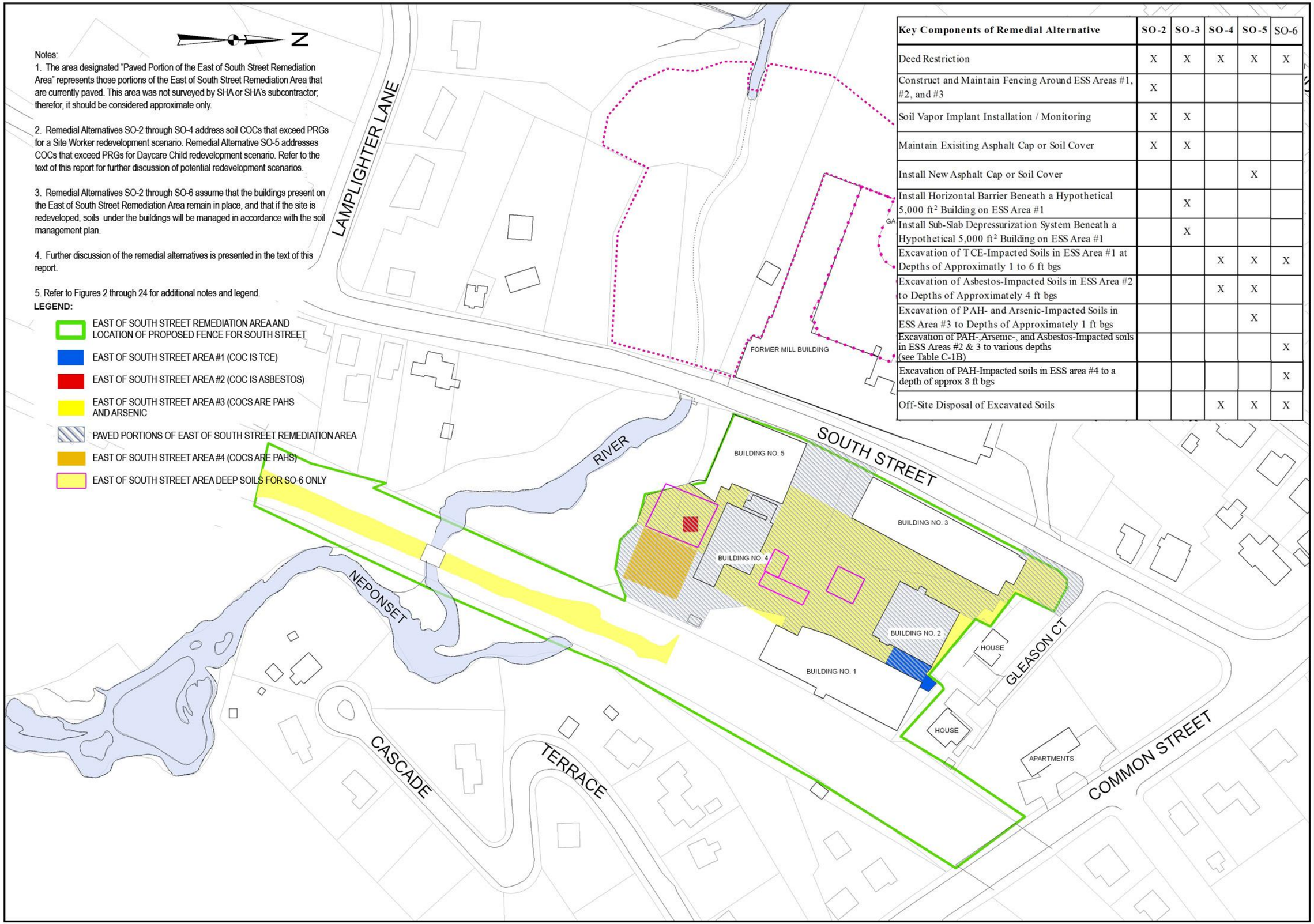
3. Remedial Alternatives SO-2 through SO-6 assume that the buildings present on the East of South Street Remediation Area remain in place, and that if the site is redeveloped, soils under the buildings will be managed in accordance with the soil management plan.

4. Further discussion of the remedial alternatives is presented in the text of this report.

5. Refer to Figures 2 through 24 for additional notes and legend.

LEGEND:

- EAST OF SOUTH STREET REMEDIATION AREA AND LOCATION OF PROPOSED FENCE FOR SOUTH STREET
- EAST OF SOUTH STREET AREA #1 (COC IS TCE)
- EAST OF SOUTH STREET AREA #2 (COC IS ASBESTOS)
- EAST OF SOUTH STREET AREA #3 (COCS ARE PAHS AND ARSENIC
- PAVED PORTIONS OF EAST OF SOUTH STREET REMEDIATION AREA
- EAST OF SOUTH STREET AREA #4 (COCS ARE PAHS)
- EAST OF SOUTH STREET AREA DEEP SOILS FOR SO-6 ONLY



Key Components of Remedial Alternative	SO-2	SO-3	SO-4	SO-5	SO-6
Deed Restriction	X	X	X	X	X
Construct and Maintain Fencing Around ESS Areas #1, #2, and #3	X				
Soil Vapor Implant Installation / Monitoring	X	X			
Maintain Exisiting Asphalt Cap or Soil Cover	X	X			
Install New Asphalt Cap or Soil Cover				X	
Install Horizontal Barrier Beneath a Hypothetical 5,000 ft^2 Building on ESS Area #1		X			
Install Sub-Slab Depressurization System Beneath a Hypothetical 5,000 ft^2 Building on ESS Area #1		X			
Excavation of TCE-Impacted Soils in ESS Area #1 at Depths of Approximatly 1 to 6 ft bgs			X	X	X
Excavation of Asbestos-Impacted Soils in ESS Area #2 to Depths of Approximately 4 ft bgs			X	X	
Excavation of PAH- and Arsenic-Impacted Soils in ESS Area #3 to Depths of Approximately 1 ft bgs				X	
Excavation of PAH-,Arsenic-, and Asbestos-Impacted soils in ESS Areas #2 & 3 to various depths (see Table C-1B)					X
Excavation of PAH-Impacted soils in ESS area #4 to a depth of approx 8 ft bgs					X
Off-Site Disposal of Excavated Soils			X	X	X

NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
60 0 60 120 180 Feet

FIGURE ORIGINATED FROM SHA'S OCT. 2007 DRAFT FS

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DESIGNED BY: LAA/LJK
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REVIEWED BY: CAC
PROJECT MGR: BAG
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BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SO-2 THROUGH SO-6 ALTERNATIVES

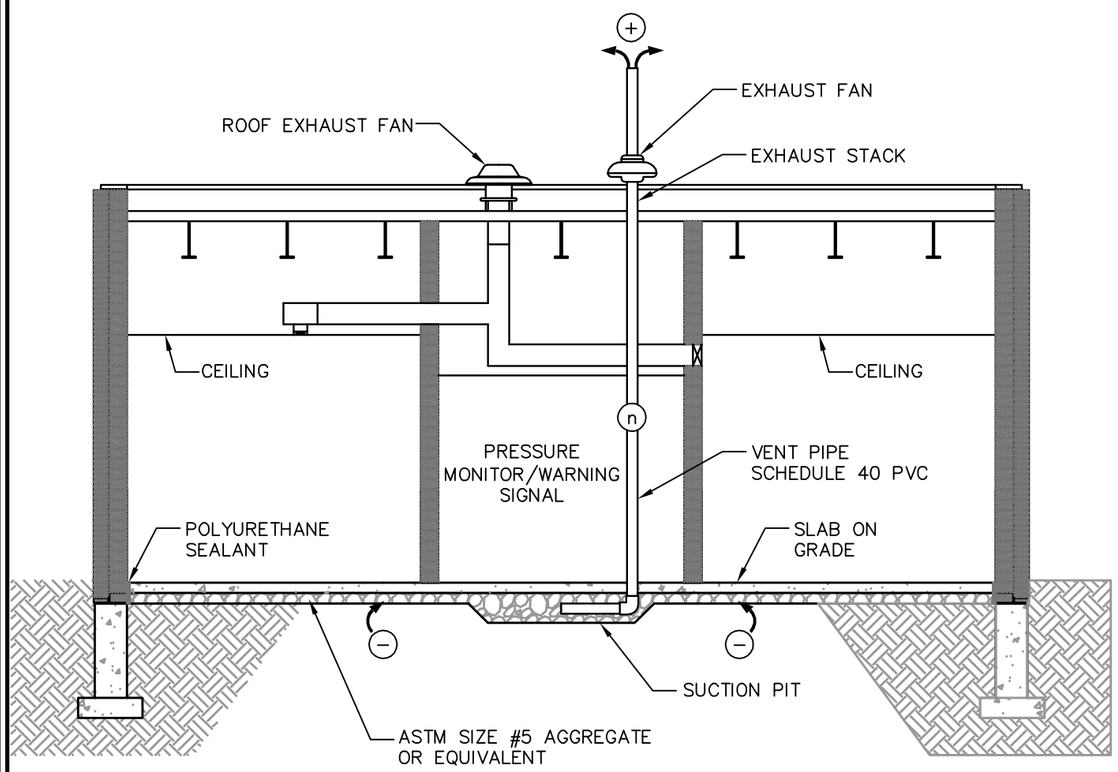
PROJECT NUMBER: 2032.01

FIGURE NUMBER: 28-A

NOTES:

1. THIS FIGURE IS INTENDED TO ILLUSTRATE A CONCEPTUAL REPRESENTATION OF A POTENTIAL VAPOR MITIGATION SYSTEM FOR A FUTURE SITE BUILDING, SYSTEM COMPONENTS AND/OR CONFIGURATION MAY VARY BASED ON ACTUAL SITE CONDITIONS.

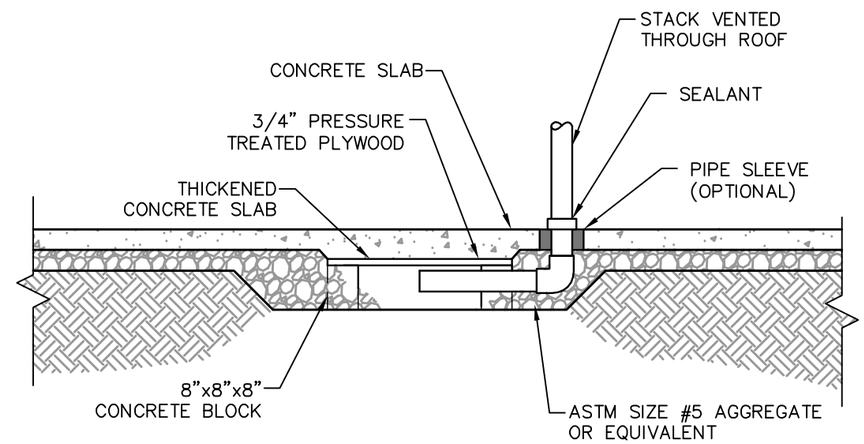
2. SOURCE: USEPA, RADON PREVENTION IN DESIGN AND CONSTRUCTION OF SCHOOLS AND OTHER LARGE BUILDINGS, EPA/625/R-92/016, JUNE 1994.



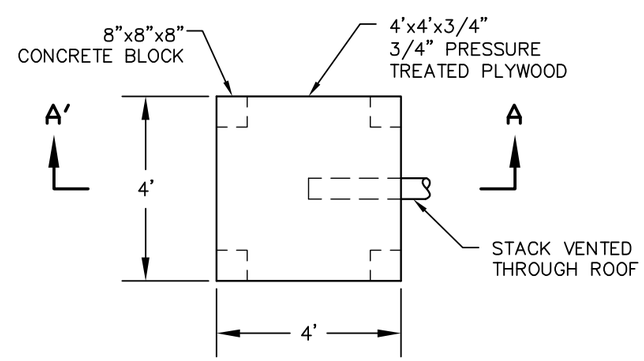
NOTE: SEAL ALL MAJOR SLAB OPENINGS, CRACKS, OR PENETRATIONS

⊖ = POSITIVE PRESSURE

⊕ = NEGITIVE PRESSURE



SECTION A–A'



NOT TO SCALE

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SCHEMATIC OF GEMEMBRANE AND SUBSLAB DEPRESSURIZATION SYSTEM (ALTERNATIVE SO-3)

PROJECT NUMBER: 2032.01

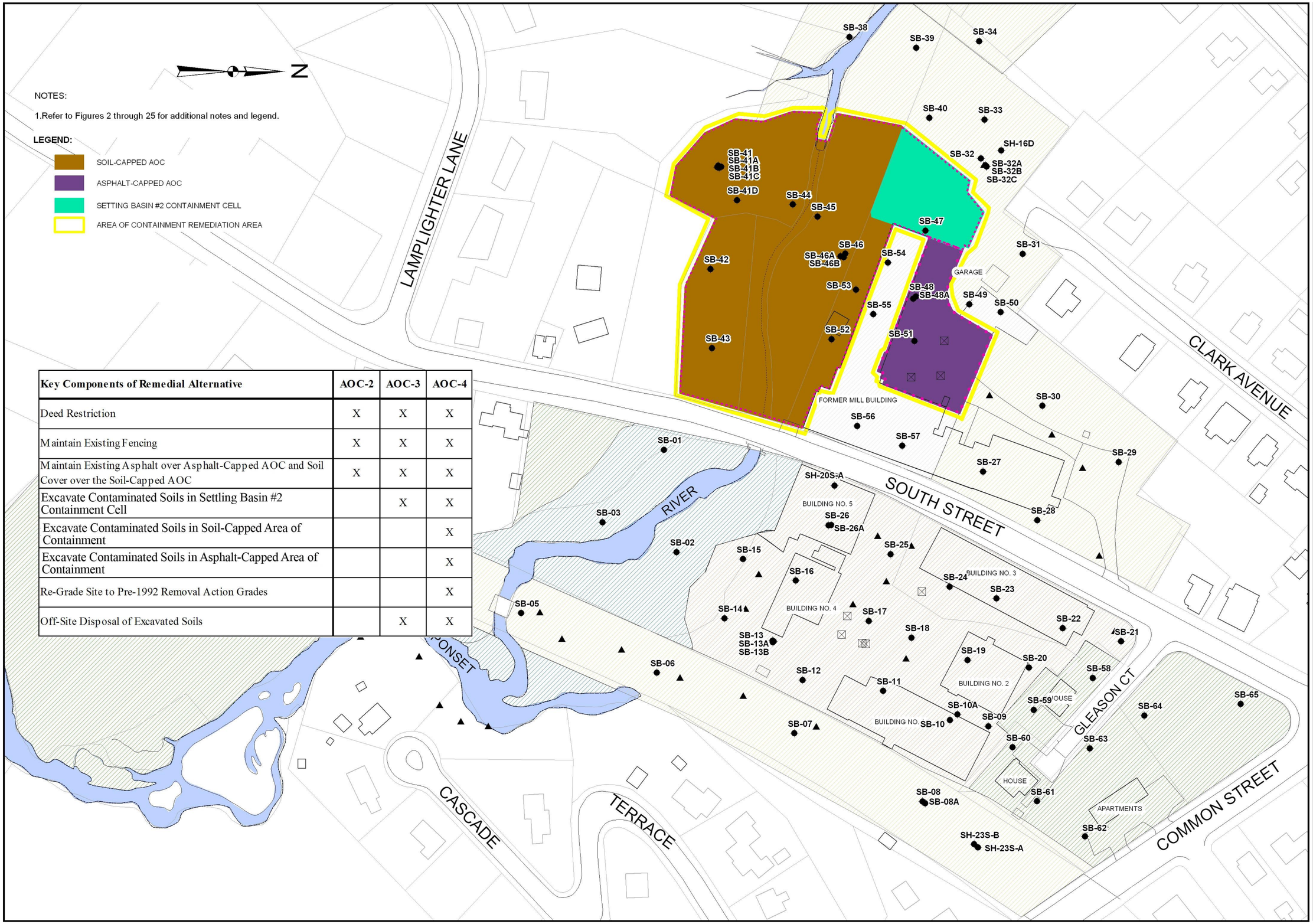
FIGURE NUMBER: 28B

NOTES:

1.Refer to Figures 2 through 25 for additional notes and legend.

LEGEND:

- SOIL-CAPPED AOC
- ASPHALT-CAPPED AOC
- SETTING BASIN #2 CONTAINMENT CELL
- AREA OF CONTAINMENT REMEDIATION AREA



Key Components of Remedial Alternative	AOC-2	AOC-3	AOC-4
Deed Restriction	X	X	X
Maintain Existing Fencing	X	X	X
Maintain Existing Asphalt over Asphalt-Capped AOC and Soil Cover over the Soil-Capped AOC	X	X	X
Excavate Contaminated Soils in Settling Basin #2 Containment Cell		X	X
Excavate Contaminated Soils in Soil-Capped Area of Containment			X
Excavate Contaminated Soils in Asphalt-Capped Area of Containment			X
Re-Grade Site to Pre-1992 Removal Action Grades			X
Off-Site Disposal of Excavated Soils		X	X

NO.	DATE	DESCRIPTION	BY

GRAPHICAL SCALE
60 0 60 120 180 Feet

FIGURE ORIGINATED FROM SHA'S OCT. 2007 DRAFT FS

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FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

AOC ALTERNATIVE CONTAMINATED SOIL REMEDIAL AREAS

PROJECT NUMBER: 2032.01

FIGURE NUMBER: 29

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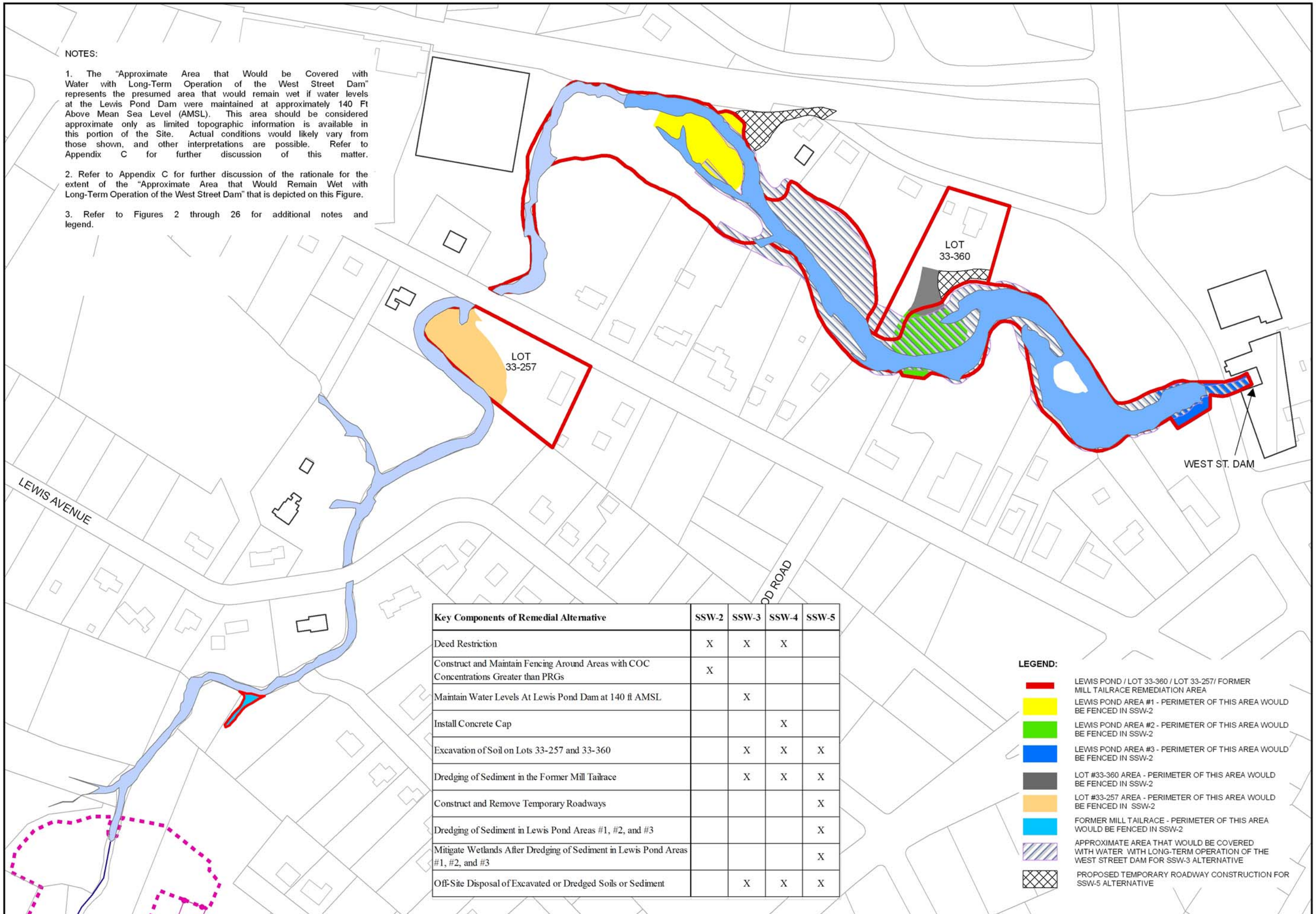
FILE: S:\CONDATA\2006\2032.01\Walpole\Figures\FS_V01\Fig29_SB_AOC_AlternativeSoil_Remdiaes_101807.mxd
PDF FILE
PLOT DATE: 09-14-07

NOTES:

1. The "Approximate Area that Would be Covered with Water with Long-Term Operation of the West Street Dam" represents the presumed area that would remain wet if water levels at the Lewis Pond Dam were maintained at approximately 140 Ft Above Mean Sea Level (AMSL). This area should be considered approximate only as limited topographic information is available in this portion of the Site. Actual conditions would likely vary from those shown, and other interpretations are possible. Refer to Appendix C for further discussion of this matter.

2. Refer to Appendix C for further discussion of the rationale for the extent of the "Approximate Area that Would Remain Wet with Long-Term Operation of the West Street Dam" that is depicted on this Figure.

3. Refer to Figures 2 through 26 for additional notes and legend.



Key Components of Remedial Alternative	SSW-2	SSW-3	SSW-4	SSW-5
Deed Restriction	X	X	X	
Construct and Maintain Fencing Around Areas with COC Concentrations Greater than PRGs	X			
Maintain Water Levels At Lewis Pond Dam at 140 ft AMSL		X		
Install Concrete Cap			X	
Excavation of Soil on Lots 33-257 and 33-360		X	X	X
Dredging of Sediment in the Former Mill Tailrace		X	X	X
Construct and Remove Temporary Roadways				X
Dredging of Sediment in Lewis Pond Areas #1, #2, and #3				X
Mitigate Wetlands After Dredging of Sediment in Lewis Pond Areas #1, #2, and #3				X
Off-Site Disposal of Excavated or Dredged Soils or Sediment		X	X	X

GRAPHICAL SCALE
Feet
60 0 60 120 180

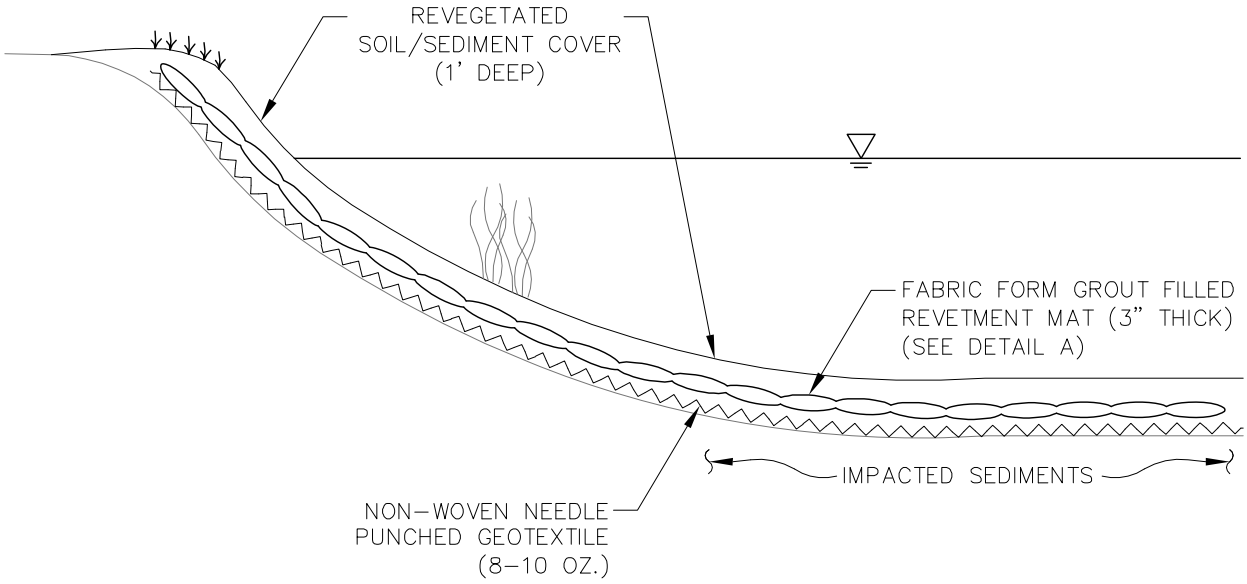
NO. DATE DESCRIPTION BY

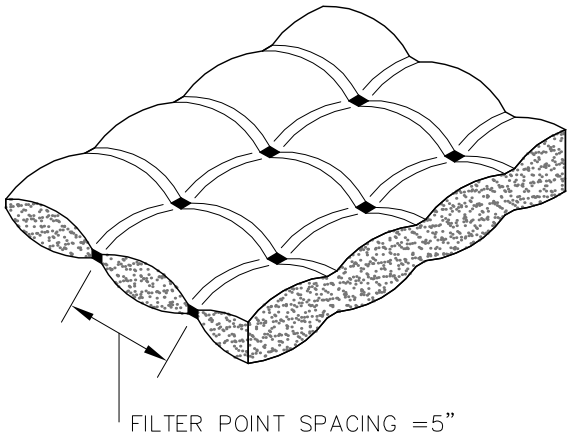
FEASIBILITY STUDY REPORT
BLACKBURN & UNION PRIVILEGES SUPERFUND SITE
WALPOLE, MASSACHUSETTS

SSW-2 THROUGH SWW-5 ALTERNATIVES

PROJECT NUMBER
2032.01

FIGURE NUMBER
30





DETAIL A
FABRIFORM® FILTER POINT FABRIC STYLE

NOTES:

1. FABRIFORM FILTER POINT FABRIC DETAIL PROVIDED BY J.F. BRENNAN CO., INC.
2. THIS FIGURE IS INTENDED TO ILLUSTRATE A CONCEPTUAL REPRESENTATION OF AN ENGINEERED ISOLATION CAP SYSTEM; SYSTEM COMPONENTS AND/OR CONFIGURATION MAY VARY BASED ON ACTUAL SITE CONDITIONS.

BLACKBURN & UNION PRIVILEGES SUPERFUND SITE WALPOLE, MASSACHUSETTS	SCHEMATIC OF ENGINEERED ISOLATION CAP AND VEGETATIVE COVER	
	SCALE: NTS	FILE NO.2032.01
	DATE: SEP 07	FIGURE NO. 31