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PRELIMINARY CLOSE OUT REPORT

Somersworth Sanitary Landfill Superfund Site
Somersworth, New Hampshire

September 2005

**Preliminary Close Out Report
Somersworth Sanitary Landfill
Somersworth, Strafford County, New Hampshire**

I. INTRODUCTION

This Preliminary Close Out Report (PCOR) documents completion of all physical, remedial construction activities at the Somersworth Sanitary Landfill Superfund Site (the "Site") in accordance with *Close Out Procedures for National Priorities List Sites* (OSWER Directive 9320.2-09A-P). EPA and the State of New Hampshire conducted a pre-final inspection on June 15, 2004, and no outstanding construction items were identified. Therefore, no additional, substantial construction is anticipated at the Site.

II. SUMMARY OF SITE CONDITIONS

Background

The Somersworth Sanitary Landfill Superfund Site (the "Site") is located on the north side of Blackwater Road approximately 300 to 400 feet west of the intersection of Blackwater Road and High Street (State Route 9) and one mile southwest of the center of the City of Somersworth in Strafford County, New Hampshire (Figure 1). The Site includes the approximately twenty-six acre waste disposal area and adjacent wetlands northwest of the former landfill. The City owns the entire landfill area and much of the wetlands. Numerous residential properties exist to the south, east and west of the Site, including two apartment buildings located adjacent to the northeast corner of the Site. A fire station and a National Guard Armory are located just east of the Site. Approximately ten acres of the eastern portion of the Site were reclaimed in 1978 by the City for use as recreational facilities, tennis and basketball courts, ball fields, and a playground.

The Somersworth Sanitary Landfill accepted municipal and industrial wastes from the mid-1930's until 1981 when the City began taking wastes to a regional incinerator. With the cessation of landfilling operations, the City installed four ground water monitoring wells near the northern and western boundaries of the landfill. Samples taken from these wells indicated the presence of volatile organic compound (VOC) contamination. The Site posed a potential threat to human health through the ingestion of contaminated ground water.

EPA proposed the Site to the National Priorities List (NPL) on December 30, 1982 (47 FR 58476). The final listing on the NPL occurred on September 8, 1983 (48 FR 40658).

Selected Remedy

On June 21, 1994, a Record of Decision (ROD) was issued for the Somersworth Sanitary Landfill Superfund Site. The selected remedy specified in the ROD included both source control and management of migration components to obtain a comprehensive remedy.

The source control remedial components of the preferred alternative included:

- "installation of a treatment wall composed of impermeable barrier sections and innovative, permeable, chemical treatment sections to provide in-situ (in-place), flow-through treatment of contaminated ground water at the landfill waste boundary (the compliance boundary). The barrier sections,

sheet piling or slurry walls, will direct contaminated ground water through the treatment sections where detoxification of the VOCs will occur; and

- placement of a permeable cover over the landfill allowing precipitation to flush contamination from the waste area. This cover will remain as long as contaminants continue to leach from the landfill waste and the chemical treatment "wall" is functioning. After cleanup levels have been achieved and can be maintained without use of the treatment "wall," EPA will evaluate an appropriate landfill cover to be installed to close the landfill."

The management of migration remedial components of the preferred and contingency remedies included:

- "installation of a pump in bedrock monitoring well B-12R to extract contaminated ground water. The contaminated ground water will be either discharged onto the landfill to enhance flushing or injected just upgradient of the chemical treatment wall to receive treatment for the preferred alternative or treated with the extracted overburden ground water for the contingency alternative. The need for bedrock ground water extraction wells down gradient of the chemical treatment wall or perimeter slurry wall will be investigated during the design. This investigation will focus on the number, location, and flow rate of the wells; the timing of their installation; and the impacts on the overall ground water cleanup; and
- natural attenuation of contaminated groundwater beyond the compliance boundary to lower contaminant concentrations through physical, chemical and biological processes until groundwater cleanup levels are met."

Additional remedial components of the selected remedy included:

- "institutional controls to ensure that the affected ground water will not be used until ground water cleanup levels have been met; and
- a detailed ground water monitoring program to be developed during remedial design. The program will address long-term monitoring of the aquifer and performance monitoring of the chemical treatment wall."

Finally, the 1994 ROD included a contingency alternative. The contingency alternative was to be invoked if it was determined that the source control preferred alternative would not meet performance standards. The source control contingency alternative included:

- "construction of a diversion trench on the upgradient side of the landfill to intercept and divert groundwater around the landfill. To the extent practicable, this diverted groundwater will be used to recharge the downgradient wetlands. A perimeter slurry wall would be completed around the landfill waste. Permeable treatment sections of chemical treatment wall would be removed and replaced by slurry wall material. The final component would be a landfill cover which complies with RCRA C requirements. The purpose of these components is to lower the ground water to below the waste in an attempt to meet interim ground water cleanup levels in the overburden aquifer at the compliance boundary. The ground water levels would be monitored to determine if

the water table would be lowered below the waste and ground water quality would be monitored to ensure that overburden ground water will meet interim ground water cleanup levels at the compliance boundary. If either of these conditions cannot be met, then extraction and treatment of overburden ground water from within the slurry wall will be implemented. The remedial design will determine the number, location and pumping rates of each well, as well as, the most appropriate treatment technology and discharge location. On-site treatment and disposal methods and pretreatment and discharge at the Somersworth wastewater treatment facility are the two options which will be evaluated.”

The 1994 ROD also specified interim ground water cleanup levels, as shown below:

<u>Contaminant</u>	<u>Interim Cleanup Level (ppb)</u>
Benzene	5
1,1-Dichloroethylene	7
Cis-1,2-Dichloroethylene	70
Trans-1,2-Dichloroethylene	100
Methylene Chloride	5
Tetrachloroethylene	5
Trichloroethylene	5
Vinyl Chloride	2

Remedial Construction Activities

After issuance of the 1994 ROD, EPA began negotiations with the Potentially Responsible Parties (PRPs) for the Site to design, construct and operate the selected remedy, as described above. These negotiations concluded with the successful entry of a consent decree on March 19, 1996. Under the terms of the consent decree, two (2) Work Settling Defendants (i.e., General Electric Company and the City of Somersworth) agreed to perform the Remedial Design/Remedial Action (RD/RA) for the selected remedy while the other PRPs agreed to help finance the cleanup.

Subsequently, extensive pre-design studies were undertaken between 1996 and 1999. These studies included two pilot installations of permeable reactive barriers at the Site. As a result, a continuous permeable reactive barrier was designed, rather than a funnel-and-gate configuration. Bedrock ground water pre-design studies concluded that an extraction well placed near bedrock monitoring well B-12R would more effectively remove the source of the bedrock ground water contamination and allow natural attenuation to meet the interim ground water cleanup levels. These studies also concluded that additional bedrock ground water extraction wells downgradient of the landfill were not necessary.

On-site construction of the source control remedial components of the preferred alternative began on July 17, 2000. This work included the installation of the permeable reactive barrier (also referred to as the Chemical Treatment Wall - CTW) which was completed in September, 2000. This was followed by the placement of a permeable cover over the landfill during the summer of 2001.

Construction of the management of migration remedial components of the preferred alternative began with the installation of ground water extraction well BRW-1 in April 1996. The infrastructure needed for the extraction and discharge of the ground water (e.g., pump, subsurface

pipng and vault, and infiltration gallery on top of the landfill) was completed during the summer of 2001 (Figure 2).

EPA and the State of New Hampshire conducted a pre-final inspection at the Site on June 15, 2004, and no outstanding construction items were identified at that time. Subsequently, EPA and the State of New Hampshire have performed several followup Site visits during 2005.

The permeable reactive barrier has been operating since September, 2000 with only a very few ground water anomalies identified to date. Ground water sampling is typically done at most monitoring wells, along the reactive barrier and throughout the Site, three times a year by GeoSyntec Consultants, the Work Settling Defendants' prime contractor. Additionally, annual monitoring and demonstration of compliance reports are submitted to EPA and the State of New Hampshire for review and comment.

Specific ground water monitoring of the permeable reactive barrier from 2001-present indicates that it is generally performing in compliance with the performance standards established (i.e., ground water passing through the reactive barrier meets the interim cleanup levels). EPA (in consultation with the State of New Hampshire) informed the Work Settling Defendants of this determination in a letter dated February, 2003. Subsequently, sporadic exceedances of the interim cleanup levels down gradient of one segment of the permeable reactive barrier were observed in April and July 2004. However, no ground water exceedances of the interim cleanup levels were observed during the following two sampling events. Additional monitoring wells and sampling are being performed in 2005 to better understand the nature of this anomaly.

Based on the existing ground water monitoring performed to date, it is **not** anticipated that there is a need to implement the source control contingency alternative described in the 1994 ROD.

The bedrock ground water extraction and recharge system has been fully operational since November, 2001. The extraction well was initially operated at a design flow rate of 10 to 12 gallons per minute (gpm). Over time, the extraction rate declined; until in June, 2004, the well was cleaned and redeveloped, and a new pump was installed. A pump failure in February, 2005, and the observation of iron fouling in the subsurface piping, required another new pump and the cleaning of the subsurface piping in June, 2005. Presently, the extraction well is operating at a flow rate between 10 and 15 gpm.

The selected remedy also required the establishment of institutional controls at the Site. These institutional controls have included the installation of fences and other physical barriers to discourage vandalism and tampering of the various remedy components. In addition, pursuant to the City of Somersworth's zoning and land use authority, a "Groundwater Protection District" was promulgated on January 10, 2000 which prohibits the pumping of ground water from any well, trench, sump or other structure for residential, irrigation, agricultural or industrial purpose within a Ground Water Management Zone designated under State of New Hampshire rules (Figure 7.1).

Ground water monitoring is expected to continue for an estimated fifty-five years until the interim ground water cleanup levels are anticipated to be achieved and maintained.

No activities were conducted using removal authority at this Site.

As noted previously in Section II above, recreational reuse has occurred by the City of Somersworth over approximately 10 acres of the eastern portion of the Site. This reuse activity

was undertaken by the City on their own accord (i.e., without EPA or State review or approval). Additional reuse options for the remaining 15+ acres of the landfill area have included the potential for soccer fields while the remaining areas of the Site are principally wetlands.

Additional On-Site Construction Activities

Soil gas investigations undertaken in 2001 and 2002 resulted in the discovery of potentially unacceptable levels of methane migrating off-site towards residences and other buildings near the landfill. While not specified as a remedial component in the 1994 ROD, a passive gas collection trench was designed to intercept and vent the landfill gas near the perimeter of the landfill. The trench was completed in December, 2003 with final grading and vegetative plantings being completed in June, 2004.

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

EPA and the State of New Hampshire reviewed and approved the "Preferred Remedial Action 100% Design and Demonstration of Compliance Plan" (1999) and the "100% Design Update" (2000). Construction activities at the Site were consistent with the 1994 ROD, RD plans and specifications, and the RD/RA statement of work in the consent decree.

The Work Settling Defendants' construction contractor adhered to the approved construction quality assurance/construction management (CQA/CM) program. All confirmatory inspection, independent testing, audits, and evaluations of materials and workmanship were performed in accordance with the construction drawings, technical specifications and construction quality assurance program. The EPA RPM, the EPA geotechnical specialist, and state personnel visited the Site regularly throughout the various stages of pilot projects and construction to review progress and to evaluate and review the results of QA/QC activities. Deviations or non-adherence to QA/QC protocols, drawings, or specifications were properly documented and resolved.

On February 22, 2000, EPA approved the Work Settling Defendant's Sampling and Analysis Plan which includes the *Field Sampling Plan* and the *Quality Assurance Project Plan*. These plans were developed to address quality assurance and quality control procedures for analytical and sampling techniques to be used during the performance of remedial activities at the Somersworth Sanitary Landfill Superfund Site. These documents identify project responsibilities and prescribe the necessary procedures to assure that the project was conducted consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), applicable EPA guidance documents, and approved EPA data quality objectives.

IV. ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

It is estimated that the interim ground water cleanup levels will be attained beyond the compliance boundary and throughout the wetlands northwest of the landfill in approximately fifty-five years. It is also estimated that this and all other remedial activities will be completed according to the schedule below:

SCHEDULE FOR SITE COMPLETION

Task	Estimated Completion Date	Responsible Organization
First Statutory Five-Year Review	September, 2005	EPA
Approve Interim RA Report	September, 2005	EPA
Ground water monitoring and remediation	December, 2055	Work Settling Defendants
Final Site Inspection	December, 2055	EPA/State
Final Close Out/Remedial Action Report	December, 2055	EPA
Deletion from NPL	June, 2056	EPA

All preliminary completion requirements for the Site have been met as specified in OSWER Directive 0320.2-3C. Specifically, a pre-final inspection was conducted by EPA and the State of New Hampshire which verifies that construction of the preferred source control and management of migration remedial actions is complete as outlined in the 1994 ROD. The bedrock ground water extraction system and the permeable reactive barrier are both operational and functional.

V. SUMMARY OF REMEDIATION COSTS

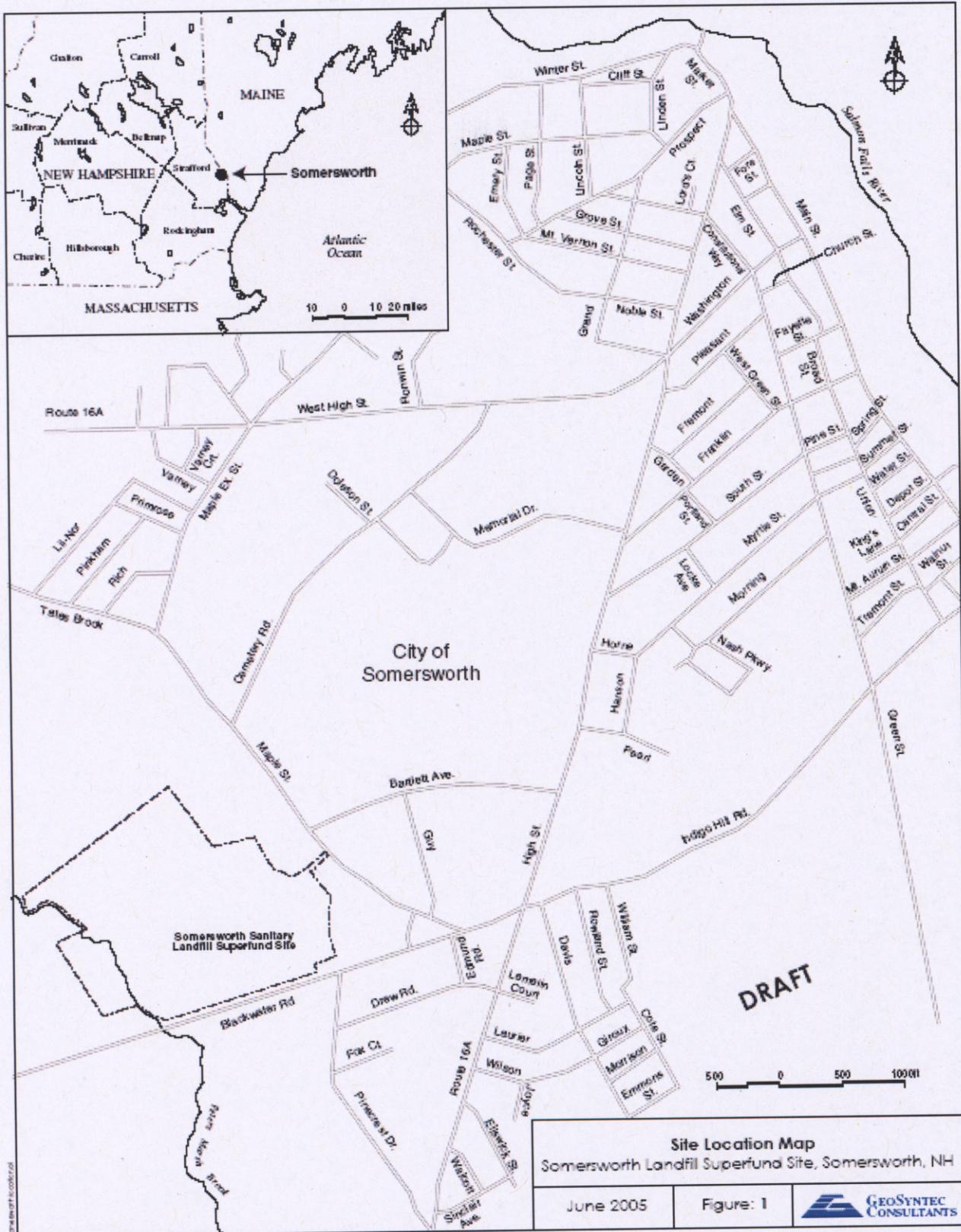
A summary of the costs of the selected remedy (including both the preferred and contingency alternatives), as presented in the 1994 ROD, in comparison to the actual construction and O&M costs are provided in Table 1 attached hereto. EPA oversight costs for design and construction activities are estimated at between \$100,000-200,000.

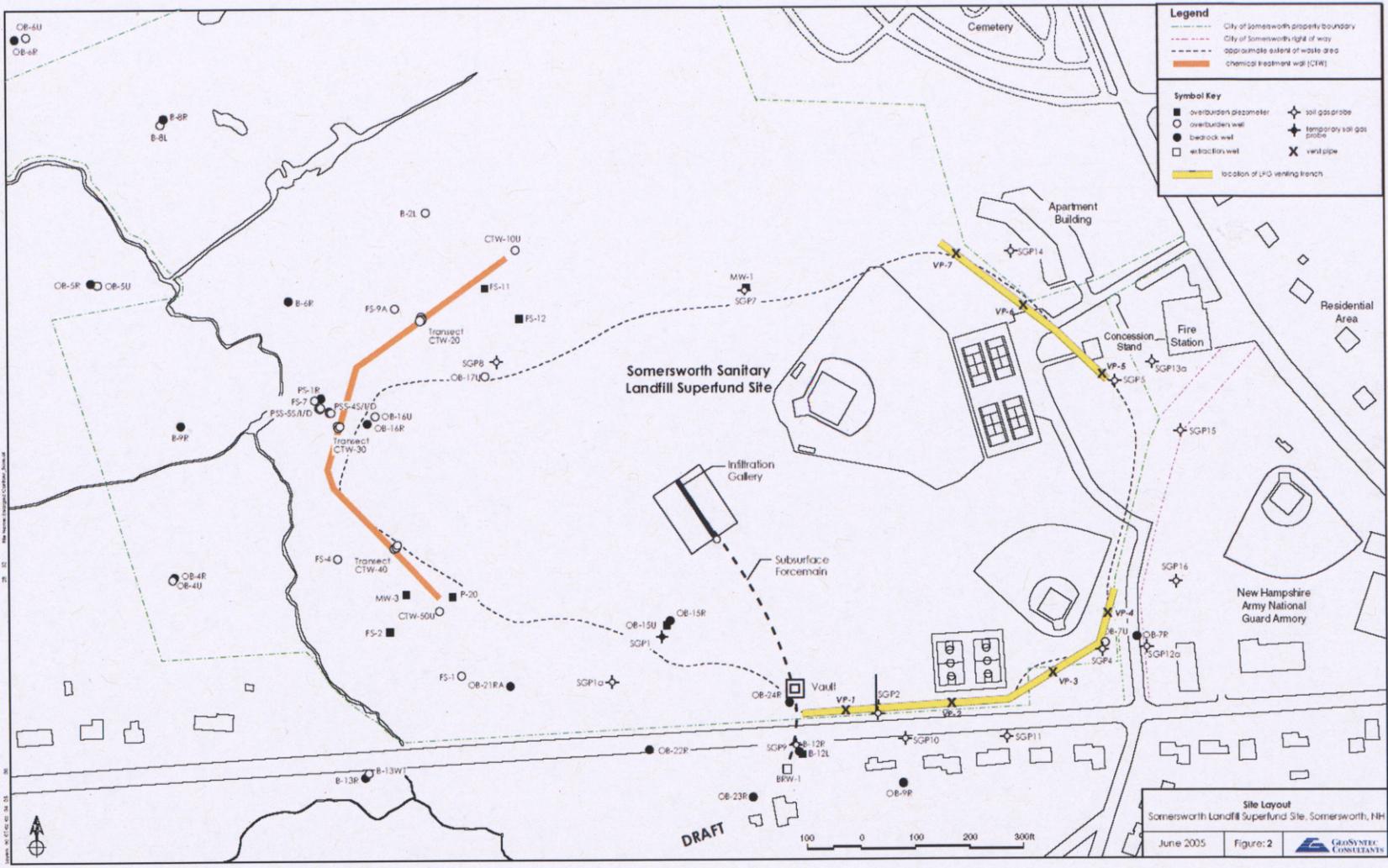
VI. FIVE-YEAR REVIEW

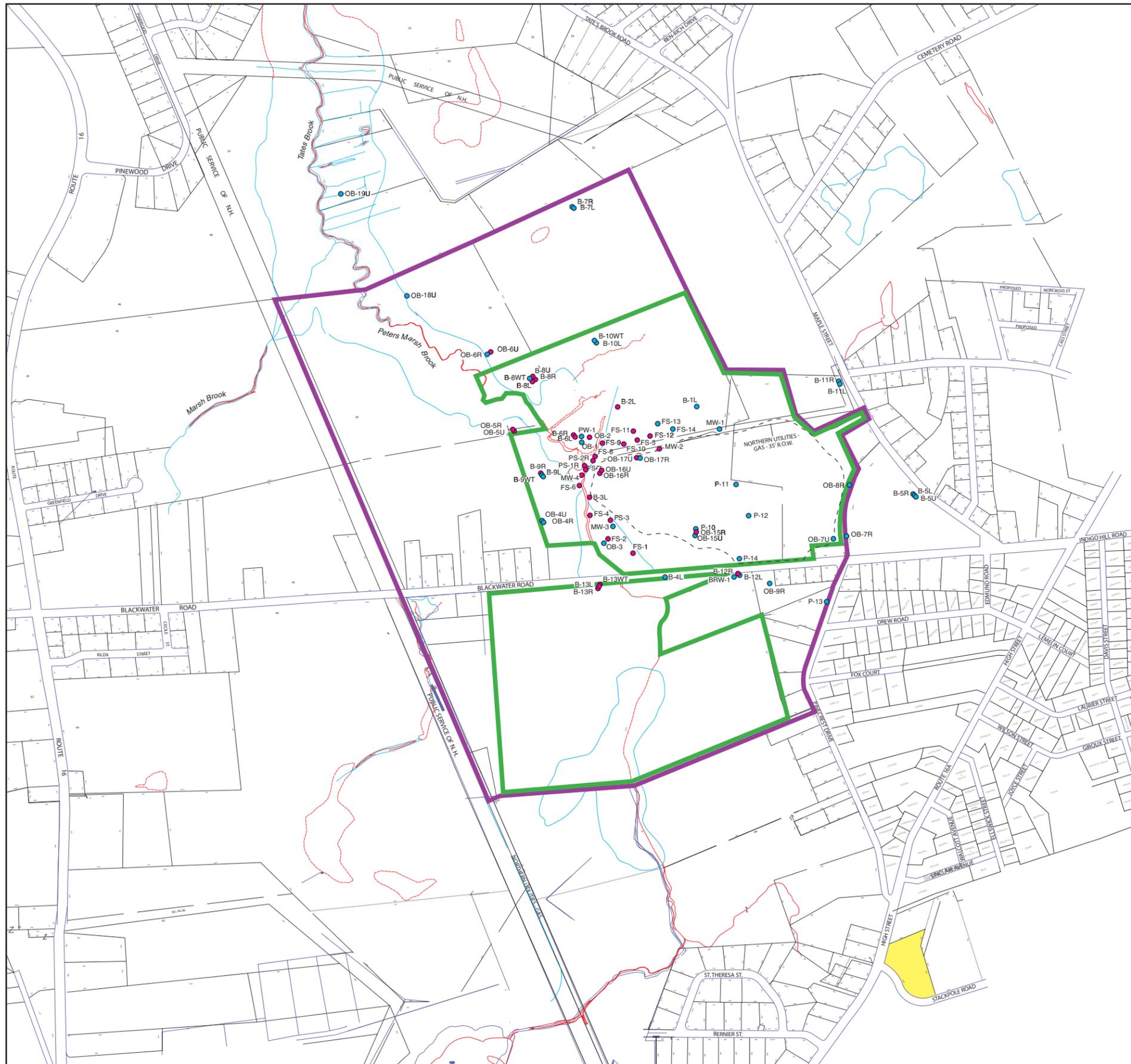
Hazardous substances will remain at the Site above levels that allow unlimited use and unrestricted exposure after the completion of the action. Pursuant to CERCLA Section 121(c) and as provided in the current guidance on Five-Year Reviews; OSWER Directive 9355.7-03B-P, June 2001, EPA must conduct a statutory five-year review. The initial Five-Year Review Report will be completed in September, 2005.

Susan Studlien
 Susan Studlien, Director
 Office of Site Remediation and Restoration

09/09/05
 Date

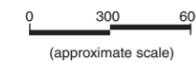






- State Well Records Indicate a Water Supply Well on this Lot
- City Owned Land Within Groundwater Management Zone
- Approximate Edge of Waste
- Boundary of Groundwater Management Zone
- Between 1996 - 1998 ICLs were exceeded for at least one CE
- Between 1996 - 1998 ICLs were not exceeded for any CE

CE - Chlorinated Ethenes (tetrachloroethene, trichloroethene, cis- and trans-1,2-dichloroethene and vinyl chloride)



Groundwater Management Zone
Somersworth Landfill Superfund Site, Somersworth, NH

Table 1. Comparison of 1994 ROD Cost Estimate with Actual Construction/O&M Costs

Cost Item	ROD Estimate (in 1993 \$)	ROD Estimate (in 2000 \$**)	Actual Cost without LFG Trench (costs to the end of 2004)	Actual Cost with LFG Trench (costs to the end of 2004) ***
Pre-Design Investigation Cost	NA	NA	\$1,720,000	\$1,720,000
RA Capital Cost	\$12,744,700	\$15,089,725	\$4,034,000	\$4,770,000
RA OM&M Cost	\$2,240,100	\$2,652,278	\$896,000	\$946,000
Total RA Cost (without Pre-Design Investigations)	\$14,984,800	\$17,742,003	\$4,930,000	\$5,716,000
Total Cost (RA and Pre-Design Investigations)	NA	NA	\$6,650,000	\$7,436,000
Difference between Actual Total RA Cost Spent to Date and ROD Estimate of Total RA Cost (Capital plus OM&M Spent to Date) *	--	--	(\$12,812,003)	(\$12,026,003)

Notes:

* The difference between the Actual Total RA Cost Spent to Date and ROD Total RA Cost Estimate is due to the fact that the Actual Total RA Cost Spent to Date does not include OM&M costs past the year end of 2004 and that the ROD estimate includes the cost for a RCRA C landfill cover as the "final" cover for the site. Both the ROD and Final ROD RA Statement of Work (SOW) recognize that the final landfill cover may be something other than a costly RCRA C cover. As stated in the ROD (page 39) "after cleanup levels have been achieved and can be maintained without use of the chemical treatment 'wall', EPA will evaluate an appropriate cover to be installed to close the landfill. A significant cost reduction could be realized." The SOW provides (page 26) that "the Work Settling Defendants shall submit an evaluation and proposal to EPA and NHDES, based on the data collected in the monitoring programs, of an appropriate landfill cover to be installed to close the landfill that is consistent with the ROD...the types of landfill cover that may be determined to be appropriate ... range from continued maintenance of the permeable cover to installation of a RCRA Subtitle C or D cap.

** ROD Cost was adjusted from 1993 \$ to 2000 \$ using U.S. Department of Labor Consumer Price Index factor of 1.134

*** ROD Cost Estimate did not include costs for the LFG Trench

Actual OM&M costs include money spent to the end of 2004 and do not include an adjustment for the year the money was spent.

LFG - Landfill Gas

OM&M - Operations, Maintenance and Monitoring

NPV - Net Present Value

RA - Remedial Action

NA - Not Available

ROD - Record of Decision