Prepared for:

The Somersworth Site Group
Somersworth Sanitary Landfill Superfund Site
Somersworth, New Hampshire

FINAL INTERIM REMEDIAL ACTION REPORT FOR PREFERRED REMEDIAL ACTION AT THE SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

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REMEDIAL ACTION REPORT
CERTIFICATIONS

We certify that the components of the Preferred Source Control Remedy (except the final landfill cover), the Management of Migration Remedy, and the Landfill Gas Venting Trench that entail construction have been constructed as described in this Remedial Action Report and are operational and functional.

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LIST OF ABBREVIATIONS

BP	Bio-Polymer
BRW	Bedrock Well
CD	Consent Decree
CE	chlorinated ethene
CTW	Chemical Treatment Wall
DCA	dichloroethane
DCE	dichloroethene
EPA	United States Environmental Protection Agency
ft	feet
GMZ	Groundwater Management Zone
ICL	Interim Cleanup Levels
ICP	Instrument Control Panel
in	inch
LFG	Landfill Gas
LFGVS	Landfill Gas Venting System
MITC	methyl isothiocyanate
MSDS	Material Safety Data Sheet
NHDES	New Hampshire Department of Environmental Services
O&M	Operation and Maintenance
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PID	photoionization detector
PLC	permeable landfill cover
POC	point of compliance
ppb	parts per billion
ppm	parts per million
PRA	Preferred Remedial Action
PRB	permeable reactive barrier
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SOW	Statement of Work
TCE	trichloroethene

LIST OF ABBREVIATIONS (continued)

µg/L	micrograms per liter
VC	vinyl chloride
VOC	volatile organic compound
WSD	Work Settling Defendants
ZVI	zero-valent iron

1. INTRODUCTION

This Final Interim Remedial Action Report (RA Report) for the Preferred Remedial Action (PRA) at the Somersworth Sanitary Landfill Superfund Site (the "Site") has been prepared by GeoSyntec Consultants, Inc. (GeoSyntec) on behalf of the City of Somersworth and General Electric Company, the Work Settling Defendants (WSDs) for the Site. This draft RA Report describes the construction activities conducted to implement the Chemical Treatment Wall (CTW), permeable cover, and bedrock groundwater extractions components of the PRA. This RA Report also describes the construction activities conducted in 2003 to install the landfill gas (LFG) venting trench on the east side of the Site. This RA Report is submitted to the United States Environmental Protection Agency (EPA) and New Hampshire Department of Environmental Services (NHDES) to fulfill the requirements of the Consent Decree (CD) (EPA, 1995) for Remedial Design (RD) and Remedial Action (RA) to prepare and submit for review and comment a RA Report. The RA Report requirements are listed in Section VI (A)(5) of Appendix B of the CD.

1.1 Summary of Site Characteristics

The Site is located on the north side of Blackwater Road approximately one mile southwest of the center of the City of Somersworth (the City) in Strafford County, New Hampshire as shown in **Figure 1**. The Site layout is shown in **Figure 2**. The dominant Site feature is a former sanitary landfill that extends over an area of approximately 26 acres. The extent of the property currently owned by the City at and around the landfill is shown on **Figure 1**.

This section presents a summary of site history and conditions that was developed using information contained in the Record of Decision (ROD) for the Site (EPA, 1994) and in the Design Investigation Report for the Pilot Study that was submitted to the EPA and NHDES as part of the RD activities (Beak, 1998).

The landfill accepted municipal and industrial wastes from the mid-1930's to 1981. Initially the wastes were burned, but in 1958, the burning was stopped and the wastes were landfilled after excavating the natural soils. Soils were used to cover the wastes daily and the landfill expanded westward. The approximate extent of buried landfill wastes is shown on **Figure 2**. Approximately 10 acres of the eastern portion of the Site

have been reclaimed by the City for use as recreational facilities, tennis and basketball courts, ball fields, and a playground. Residential properties are present to the east, west and south of the Site and a wooded area and former quarry are located to the north. A National Guard Armory and fire station are also located to the east of the Site. A cemetery is located to the northeast of the Site.

The landfill is located entirely within the Peters Marsh Brook surface water drainage basin. The brook flows northwesterly through the wetlands at the Site into Tate's Brook, which in turn flows into the Salmon Falls River which is located about one mile east of the Site (see **Figure 1**).

The Site is relatively flat and low lying (see **Figure 2**) except that the quarrying activities immediately to the north of the landfill have resulted in the presence of a 15 to 20-foot vertical escarpment which runs parallel to the northern edge of the waste. The western edge of the waste slopes downward toward the wetland.

The Site is underlain by an unconfined sand and gravel aquifer ranging from about 15 to 75 feet thick. Metamorphic bedrock occurs beneath the sand and gravel overburden deposits. A peat layer is present at ground surface in and near the wetland. Groundwater flows through the overburden in a northwesterly direction. The bedrock is fractured, with flow in the shallow bedrock appearing to be slightly north of west. Groundwater from both the bedrock and overburden discharges to Peters Marsh Brook and the wetland.

Groundwater sampling conducted at the Site during the Remedial Investigation and Feasibility Study (RI/FS) between 1985 and 1992 indicated the presence of low concentrations (parts per billion to about a part per million) of the following VOCs:

- trichloroethene (also know as trichloroethylene; TCE);
- tetrachloroethene (also known as tetrachloroethylene or perchloroethylene; PCE);
- 1,1-dichloroethene (1,1-DCE);
- cis and trans isomers of 1,2-dichloroethene (cis-1,2-DCE and trans-1,2-DCE, respectively);
- 1,2-dichloroethane (1,2-DCA);
- vinyl chloride (VC);

- benzene; and
- methylene chloride (also known as dichloromethane).

Metals (specifically chromium and arsenic) were detected in the groundwater samples during the RI/FS but their concentrations were similar to background levels. Polychlorinated biphenyls (PCBs) and pesticides were not detected in the groundwater samples. Soils sampled during the RI/FS had low concentrations of VOCs and semi-volatile organic compounds. VOCs were detected in sediment and surface water samples from the wetland in 1985 and 1986; no VOCs were detected during subsequent sampling of the surface water in 1992 (sediments were not re-sampled).

The ROD (EPA, 1994; page 5, 2nd paragraph) reports that the groundwater VOC distribution downgradient of the buried waste appears to have reached a steady-state condition and that VOCs extended to approximately 1,700 feet downgradient of the waste at the time of the RI/FS. Groundwater sampling conducted during RD indicates that by 1998, the extent and overall concentration of VOCs in groundwater was significantly less than this (about 1,200 feet downgradient of the waste) and that significant natural attenuation of the VOCs in groundwater was occurring (Beak, 1998). There are VOC impacts in the bedrock groundwater to the south of Blackwater Rd however, the bedrock groundwater from this area is flowing to the northwest and discharging to the wetland area downgradient of the landfill (EPA, 1994; page 4, 4th paragraph). More recent sampling (GeoSyntec, 2003 and GeoSyntec, 2004) provides additional evidence that natural attenuation is ongoing.

1.2 Summary of Remedial Action Implementation

The Preferred Remedial Action (PRA) for the Site is described in detail in the 100% Design (Beak and GeoSyntec, 1999) that was approved by EPA and NHDES in April 1999. An update to the design was prepared in July 2000 (GeoSyntec, 2000). In summary, the PRA is comprised of:

1) a Preferred Source Control Remedy including a CTW and permeable landfill cover (PLC);
2) a Management of Migration Remedy;
3) Institutional Controls; and
4) a Groundwater Monitoring Program.

The PRA described in the Consent Decree does not include a landfill gas (LFG) venting trench, but based on soil gas monitoring conducted in 2001 and 2002 the EPA and NHDES believed that actions, such as the LFG venting trench, were necessary to mitigate methane in landfill gas near the perimeter of the landfill.

The various components of the PRA and the landfill gas (LFG) venting trench described in this report were installed between July 2000 and May 2004. **Table 1** presents the major construction milestones for Remedial Action. The Chemical Treatment Wall (CTW) was installed in 2000, the permeable cover and bedrock groundwater extractions components of the PRA were installed in 2001, and the landfill gas (LFG) venting trench on the east side of the Site was installed substantially in 2003 and was completed in the spring of 2004.

The Pre-Final Inspection Meeting was held at the Site on 15 June 2004. The meeting was attended by:

- Roger Duwart (EPA)
- Andrew Hoffman, Richard Pease, and Carl Baxter (NHDES)
- Norm Leclerc (City of Somersworth)
- Tom Krug and David Bonnett (GeoSyntec Consultants)

There were no outstanding construction items that impact the implementation of the Preferred Remedy Action (PRA) or the Landfill Gas Venting Trench identified during the meeting.

Sections 2 of this RA Report present a general description of the components of the PRA and the Landfill Gas Venting Trench. Sections 3 through 5 present additional information on the three phases of construction: 1) the CTW in 2000; 2) the permeable landfill cover and bedrock groundwater extraction system in 2001; and 3) the Landfill Gas Venting Trench in 2003. As built drawings for the components of the PRA and the Landfill Gas Venting Trench are presented in Appendix A, B and C.

2. PREFERRED REMEDIAL ACTION DESCRIPTION

The components of the PRA and the LFG venting trench are described in the following subsections.

2.1 Preferred Source Control Remedy

The Preferred Source Control Remedy includes installation of a CTW to provide in-situ, flow-through treatment of groundwater containing chlorinated ethenes (CEs) at the downgradient edge of the waste management area of the landfill. The CTW was constructed during the summer of 2000 at the location shown in **Figure 2**. The construction of the CTW is described in Section 3 and in the Draft Chemical Treatment Wall Construction Completion Report (GeoSyntec 2001b). According to the Statement of Work in the Consent Decree (EPA, 1995), the CTW must prevent all untreated overburden groundwater that contains CEs at concentrations greater than Interim Cleanup Levels (ICLs) from migrating from the landfill to areas beyond the Point of Compliance (POC), except for insubstantial amounts of such groundwater. The POC is the edge of the waste management area, except where the CTW has been constructed, in which case it is the outer edge of the CTW. The groundwater passing through the CTW must achieve ICLs for the CEs within 18 months after the Preferred Remedial Action Prefinal Inspection Meeting and must maintain such levels thereafter.

The Preferred Source Control Remedy also includes placement of a permeable landfill cover (PLC) and additional source control measures to remediate benzene and methylene chloride in groundwater migrating from the landfill, if necessary. The PLC covers the portion of the landfill not currently used for recreational activities. The PLC consists of approximately six inches of coarse backfill material and six inches of topsoil seeded with native grass. The purpose of the PLC is to prevent direct contact with the underlying waste material, allow for infiltration of precipitation through the landfill and control erosion.

The Preferred Source Control Remedy must also assure that groundwater migrating from the landfill to areas beyond the POC does not contain >ICL concentrations of benzene or methylene chloride 18 months after CTW construction. No additional source control measures have been identified as necessary for implementation at the Site given their absence or very low concentrations in groundwater (Beak and GeoSyntec, 1999); however, the Groundwater Monitoring Plan (Sampling and Analysis Plan (SAP),

GeoSyntec 2001a) has been developed to collect the data to address this compliance requirement.

2.2 Management of Migration Remedy

The Management of Migration Remedy is required to reduce the concentrations of VOCs in groundwater to ICLs at and beyond the POC. It includes bedrock groundwater pumping at extraction well BRW-1 located adjacent to bedrock monitoring well B-12R (located approximately 80 feet south of the edge of the waste) and natural attenuation of VOCs in groundwater downgradient of the CTW. Extracted bedrock groundwater is discharged to the infiltration gallery located on the landfill upgradient of the CTW, and treated by the CTW. The need for additional bedrock groundwater extraction must be evaluated as part of the PRA implementation.

2.3 Institutional Controls

The PRA also includes institutional controls. The 100% Design includes fencing, other physical barriers and access controls, and land and groundwater use restrictions.

2.3.1 Fencing and Other Physical Barriers

Fencing and other physical barriers have been installed around active and accessible components of the PRA to discourage vandalism and tampering and provide protection to the components as listed below.

- An 8-foot high chain link fence has been installed around the control box and the underground vault for the extraction system. The infiltration gallery and extraction well have been protected by flushmount locking protective covers.
- Protective steel casings have been installed over all monitoring wells and will be locked using heavy gauge padlocks (i.e., to withstand unauthorized access using bolt cutters).
- Dense shrubs have been planted around the soil gas vent pipes of the LFG venting system.

2.3.2 Groundwater and Land Use Restrictions

Pursuant to its zoning and land use authority, The City of Somersworth, a WSD under the CD, has established a Groundwater Management Zone (GMZ) by legislative enactment. The boundaries of the GMZ are the same boundaries as presented on the Groundwater Management Zone Overlay Map included in the Preferred Remedial Action 100% Design and Demonstration of Compliance Plan prepared by Beak International and GeoSyntec Consultants International, Inc. (Beak and GeoSyntec, 1999). The withdrawal of groundwater within the GMZ for any purpose is prohibited. The City of Somersworth has notified its residents of the groundwater use restrictions by publishing legal notices in area newspapers which described the restrictions and by posting these same notices at City Hall. In addition, the Somersworth City Council and Planning Board held separate and distinct public hearings prior to the adoption of the groundwater zoning restrictions. A list of all properties and owners located within the GMZ IS included in Appendix D.

If the zoning ordinance is repealed or amended so that it no longer prohibits the withdrawal of groundwater within the GMZ, then other types of institutional controls will be implemented in accordance with the SOW. A copy of Section 10 of the City of Somersworth Zoning Ordinance and a Certificate of City Clerk are included in this Report in Appendix D along with a copy of the Groundwater Management Zone Overlay Map included in the Preferred Remedial Action 100% Design and Demonstration of Compliance Plan.

Where access to land is required for monitoring, remedy construction or other response actions, land easements or access agreements will be used to the extent necessary. An easement has been obtained for extraction well BRW-1. Existing agreements obtained from the property owners to access existing wells are being used during RA.

2.3.3 Access

Where access to land is required for monitoring, remedy construction or other response actions necessary, land easements or access agreements will be used to the extent necessary and possible. An easement has been obtained for extraction well BRW-1. Existing agreements obtained from the property owners to access existing wells are being used during RA.

2.4 Groundwater Monitoring

The Groundwater Monitoring Plan is provided in Section 2 of the SAP to address the monitoring requirements identified in the Statement of Work (SOW) appended to the CD. The groundwater monitoring network is shown in **Figure 2**.

2.5 Landfill Gas Venting Trench

The PRA described in the Consent Decree does not include a landfill gas (LFG) venting trench but based on soil gas monitoring conducted in 2001 and 2002 the EPA and NHDES believe that certain actions, such a LFG venting trench, are necessary to mitigate methane in landfill gas near the perimeter of the landfill. A LFG venting trench was installed along the southern and eastern perimeter of the landfill as shown in **Figure 2** during 2003. The LFG venting trench is a passive system that prevents landfill gas from moving away from the landfill and allows for methane gas to escape from the subsurface.

The LFG venting trench includes two segments of a gravel filled trench with vertical vent pipes to the surface at regular intervals. The passive LFG venting system relies upon advective flow of LFG generated in the landfill and barometric pumping to convey LFG into the gravel filled trench and out through vertical vent pipes to the atmosphere. The venting trench also serves as a barrier to soil gas migration through the use of a geomembrane liner which prevents LFG from migrating past the venting trench and force the LFG out the vent pipes. The locations of the two segments of trench are shown in **Figure 2**.

The soil gas venting trench extends down to the seasonal low groundwater level. The trench is 3 feet wide with a total depth between approximately 15 feet in the southern segment to approximately 27 feet in the northern segment.

The venting trench contains gravel (#57 stone) placed from the seasonal low groundwater table to a depth of 3 feet below ground surface. A vertical geomembrane extends down the outside wall of the trench (the wall located farthest from the landfill) to act as a barrier to soil gas migration. Above the gravel, a geotextile fabric separator,

a 2.5 feet layer of compacted clay and a 0.5 foot layer of topsoil have been installed. The compacted clay is intended to limit infiltration of surface water while the geotextile separator prevents migration of sediment into the gravel filled portion of the trench.

The vent pipes are embedded vertically within the gravel and are 4 inches in diameter. The pipe in the gravel is slotted with 1/8-inch slots. The vent pipes extend 8 feet above ground surface and terminate with a wind driven turbine vent at the outlet.

3. CHEMICAL TREATMENT WALL CONSTRUCTION

3.1 Overview

Construction of the CTW involved excavation of trench panels, backfilling with granular iron or a granular iron/sand mixture, placing a geotextile fabric, installing a compacted clay layer, and then installing cover soil to the ground surface. The main activities conducted for the construction of the CTW were as follows:

- mobilized equipment, facilities, and personnel;
- installed silt fence downgradient of the construction area and placed construction warning fence around the perimeter of the site;
- created a workpad approximately 50 ft wide, 915 ft long, and 5 ft above the groundwater table and relocated landfill waste encountered during workpad construction to the top of the landfill;
- excavated various lengths of trench "panels" to bedrock surface refusal and stockpiled trench spoils on the top of the landfill;
- prepared various mixtures of granular iron and sand as per the specifications;
- backfilled panels with required concentrations of granular iron or granular iron/sand mixtures;
- graded the surface of the granular iron backfill to required elevations (based on groundwater surface elevation data);
- covered the granular iron surface with a filter geotextile and a low-permeability compacted clay layer;
- covered the compacted clay layer with a cover soil layer;
- placed topsoil and grass seed on required areas of the workpad;
- graded the relocated waste and trench spoils on the top of the landfill and covered with a layer of clean soil;

- improved the integrity of the silt fence and placed additional silt fence where required; and
- demobilized from the site.

Landfill waste encountered during the construction of the workpad and spoil material from trench excavation was graded and covered on the top of the landfill. These materials (waste and spoils) were incorporated into the top of the landfill. Also, excess slurry that was stored in an impoundment and sediment which dropped out of the slurry in the impoundment area, was placed in temporary storage tank on site pending the natural degradation of a biocide used in the slurry as a preservative.

Geo-Con began initial site preparation and workpad construction on 8 July 2000. CTW excavation and backfilling operations began on 1 August 2000 and were completed on 11 September 2000. The compacted clay layer was constructed between 14 and 21 September 2000. Grading and covering of relocated waste and trench spoils was completed on 18 September 2000. Remedial Contractor activities of the CTW construction phase were completed at the site by 28 September 2000.

3.2 CTW Construction

The CTW was constructed by excavating and backfilling a trench using a guar based bio-polymer (BP) slurry to maintain the stability of the trench prior to backfilling as shown in **Figure 3**. The excavation was performed through a workpad constructed to a minimum of 5 feet (ft) above the water table to provide stability for heavy equipment and to allow the level of the BP slurry to be maintained above the water table. Following excavation, each of the panels of the CTW was backfilled with granular iron or a mixture of granular iron and inert sand.

A compacted clay layer was constructed on top of the granular iron to prevent groundwater from flowing over the granular iron in the CTW. The clay layer was separated from the granular iron surface by a non-woven filter geotextile. A cover soil layer was then placed over the clay layer to the elevation of the surface of the workpad.

The remainder of this section describes the CTW construction in more detail.

3.2.1 Workpad Construction

A workpad was constructed along the entire length of the CTW to allow easy access of equipment to and from the trench and staging areas and to allow the level of the PB slurry to be maintained above the water table. The workpad was approximately 50 ft wide and was aligned to contain the CTW centerline approximately 10 ft from the wetland edge of the workpad. Native soils and material from an on-site borrow source located near the Blackwater Road Site entrance were used to construct the workpad. Excavation of materials and slope grading were performed with Daewoo 130, 220, and 330 trackhoes. A John Deere 750 bulldozer was also utilized for blading and grading the workpad. Wood debris (trees and roots) cleared for construction of the workpad was stockpiled on top of the landfill.

Some landfill waste was encountered during workpad construction. This waste was relocated and stockpiled in an area located in the northwest corner of the top of the landfill, and was covered with a plastic sheet. This material was eventually spread out over the top of the landfill and covered with clean fill, as discussed later in this section.

3.2.2 CTW Panel Alignment

The original alignment of the CTW was modified slightly after a pre-construction site walk in order to minimize the impact of construction activities on the adjacent wetlands. Approximately 300 ft of the southernmost length of the CTW was moved closer than originally planned to the waste area of the landfill. The CTW alignment was also modified slightly in the vicinity of the high-pressure gas pipeline located near the mid-point of the CTW. This adjustment allowed for the construction of the CTW to occur without the gas pipeline being submerged within the slurry during panel excavation and backfilling.

The CTW was divided into eight different sections along the length of the alignment, each section requiring a specific granular iron concentration based on the concentrations of VOCs in groundwater and groundwater flow in the area of each section. Each of these sections was subdivided into separate panels each approximately 33 ft to 50 ft in length. **Figure 4** shows the approximate locations of the 8 sections of the CTW.

Panels within each section were designated as being either primary or secondary. Primary panels were excavated and backfilled first without adjacent panels having been excavated. Steel I-beams were placed at both ends of the primary panels to provide a defined end to the panels. Typically, a primary panel was excavated in one day and backfilled with granular iron or a mixture of granular iron and sand on the following day. Often, the next primary panel was excavated while the previous panel was being backfilled.

After the majority of the primary panels were excavated and backfilled, construction of the secondary panels was conducted. Secondary panels were excavated down to the bedrock between the I-beams defining the ends of the adjacent primary panels. **Table 2** presents information on each of the 23 separate panels of the CTW.

3.2.3 CTW Panel Excavation

The CTW panels were excavated using a LinkBelt 7400 trackhoe equipped with a 30 inch wide "rock-ripper" bucket. Containment berms were erected around the area of the trench to form a temporary containment area with the initial soil material excavated from the initial few feet of the trench. A BP slurry (Rantec G-150 from Rantec Corporation) was added to support the trench walls during the remaining excavation. Excavated material was placed within the temporary containment area and excess slurry was allowed to drain and flow back into the trench. The drained soil material (trench spoil) was then loaded with the Daewoo 220 trackhoe into a Caterpillar 350 tri-axial dump truck and hauled to a designated area on top of the landfill.

Panel excavation continued down to the bedrock surface. Several scrapes of the bedrock surface were made with the excavator bucket to remove rock from the surface of the bedrock. For primary panels, the trench bottom was scraped across the length of the panel to locations outside where I-beam panel dividers would be placed. The 30 in wide I-beams were then lowered into the trench onto scraped areas of bedrock. For secondary panels, a metal flat-plate attachment was affixed to the hoe bucket to remove material between the flanges of the I-beams and at the corners made by I-beams and the bedrock surface.

PVC development wells were installed in each panel following completion of the excavation. The wells were custom-made based on the depth of the panel, with the bottom 20 ft of each well being slotted. A metal weight was affixed to the bottom of

each well to allow the well to sink to the bottom of the excavated trench. The top of each well was held in place by securing the well with wire to two 6 inch by 6 inch wooden beams placed perpendicular to the trench. The wells were installed to allow for removal of some of the PB slurry and to allow for the addition of chemicals to enhance the breakdown of the remaining BP slurry following construction

3.2.4 Granular Iron/Sand Preparation

The granular iron filings for the CTW were supplied by Connelly-GPM, Inc. (Connelly) of Chicago, Illinois. The granular iron was shipped to Site in closed trucks transported via railway flat bed cars. The granular iron was shipped in 3,000 pound (1.5 ton) bags, each on a wooden pallet. Each bag was equipped with straps for lifting. Most of the granular iron had been delivered to the Site and stored before Geo-Con mobilized to Site. Off-loading and storage of granular iron was performed by Turgeon Construction Co. of Somersworth, New Hampshire (Turgeon), under subcontract to Geo-Con. The bags of granular iron were stored in an area north of the Site access road near the Maple Street entrance. The bags were stored in rows three bags high and covered with plastic sheet for moisture protection.

The sand used in the granular iron/sand mixture was delivered from Ossipee Aggregates (Ossipee), in Ossipee, New Hampshire. Sand was delivered by truck and was stockpiled in a storage area located near the site entrance on Maple St., east of the granular iron staging area. The sand used in the granular iron/sand mixtures was "double washed" to remove excess fine sand material.

A mixing truck, referred to as the "Elkin" mixer, was used to mix the granular iron and sand to obtain the appropriate mixtures for each of the CTW Sections. The Elkin mixer had separate granular iron and sand hoppers, each with an adjustable gate to feed variable amounts of material onto a single conveyor. The conveyor emptied both materials simultaneously into an auger mixing system, which dispensed the mixed material onto a concrete pad for loading. A front-end loader was used to transport the sand from the sand stockpile into the sand hopper of the Elkin mixer. Granular iron was loaded into the second hopper of the Elkin mixer using a Lull 844 all terrain forklift to suspend the granular iron bags over the granular iron hopper while a worker slit the bottom of the bag to allow the granular iron to empty into the hopper.

3.2.5 CTW Panel Backfill

A tremie pipe was used to deliver the granular iron or granular iron and sand mixture to the bottom of the trench to minimize contact of the granular iron with PB slurry and to minimize the turbulence in the open trench. The tremie was constructed of a 10 ft length of 24 inch diameter metal pipe with a hopper on the top, and three additional removable 10 ft lengths of 24 inch pipe. The tremie was moved into place and supported in the trench during backfill operations using a large crane. A "Screen Machine" conveyor system was used to deliver the granular iron backfill material to the hopper of the tremie pipe. Front-end loaders were used to transport the granular iron/sand mix from the concrete loading pad near the Elkin mixer and dump the mix into the screened hopper of the conveyor system. The conveyor belt transported the granular iron mixture directly into the hopper of the tremie. A water pipe and water sprayer were attached to the top of the conveyor system to saturate the granular iron with water as it was poured into the hopper of the tremie. This water was added to fill void spaces of the granular iron mixture to reduce the contact of slurry with the surface of the granular iron.

As backfill operations were conducted and the level of the granular iron in the trench increased, sections of the tremie pipe were removed so the hopper of the tremie was maintained at a suitable height for the conveyor system. As the tremie was lifted out of the trench it was moved along the length of the trench to distribute the granular iron inside tremie along the trench. Backfilling operations were suspended for short periods of time while the sections of the tremie were removed. The slurry displaced during the backfilling operation was allowed to flow by gravity through a shallow trench to a lined slurry impoundment were the PB slurry was allowed to degrade and suspended material was allowed to settle out.

Once the level of granular iron in the trench reached the required height, addition of granular iron ceased. The slurry remaining over the surface of the backfilled material was removed either by pumping with a 6 inch diameter Godwin pump or by bailing with the bucket of the Daewoo 130 or 220 trackhoe. Once the granular iron surface was exposed, a sacrificial geotextile was placed over the granular iron surface and the panel was backfilled with temporary fill material while the remaining panels were excavated and backfilled and the compacted clay layer could be installed.

3.2.6 Compacted Clay Layer

After all the individual panels of the CTW were backfilled, a 3 foot thick layer of compacted clay layer was placed above the granular iron to prevent groundwater from passing over the top of the CTW untreated. The compacted clay layer was constructed by first removing temporary fill and the sacrificial geotextile in the panels and exposing a clean granular iron surface. The granular iron surface was graded to the required elevations as per the 100% Design. This elevation corresponded to the lowest observed water level at the location of the section. Material excavated from the trench was stockpiled adjacent to the trench. A permanent filter geotextile was then placed over the granular iron surface. A bridge lift of low-permeability clay was then placed over the geotextile to a level slightly above the observed water table. This bridge lift was graded and tamped with the bucket of the Daewoo 130 trackhoe. Additional 8-inch layers of clay were then placed on top of the bridge lift until the required 3 foot thick layer of clay was in place. A "Wacker Packer" walk-behind, padfoot compactor was utilized to compact each lift of clay. Soil for the compacted clay layer was supplied by Turgeon.

3.2.7 Cover Soil

After construction of the compacted clay layer was completed, cover soil was placed over the clay layer. The cover soil was obtained from fill material excavated and stockpiled adjacent to the CTW during clay capping operations and from material obtained from the surface of the workpad. At least 2 ft of cover soil was placed over the compacted clay layer.

3.2.8 Topsoil

Topsoil was placed on the northernmost 400 ft of the workpad. The soil was placed from the centerline of the CTW to the toe of the outboard slope of the workpad. The topsoil was manually seeded with grass, utilizing a hand-held seed broadcaster, and was then covered with straw. Grass seed was also placed on the northernmost 400 ft of the workpad that was not covered with topsoil. No topsoil was placed over the remainder of the workpad, which was incorporated into the final cover system constructed in 2001.

3.2.9 Repairs

Some difficulties were encountered during construction of several of the CTW panels and repairs to these panels were required. Repairs were performed either by adding more granular iron to a panel to attain the required elevation or by replacing material with suspect granular iron concentrations within a panel. The following panel repairs were completed after all panels of the CTW were installed.

- After backfill operations were completed in Panel 8B, it was found that the granular iron surface was approximately 3 ft below the required elevation on the side nearest to the end of CTW. The panel was repaired by excavating an open cut to the surface of granular iron in the panel with the Daewoo 220 excavator and then adding granular iron/sand mix until the required grade was attained.

- Part of Panel 1A (the first panel constructed) was also not backfilled to the required elevations during initial construction. Attempts to expose the surface of the granular iron during repair proved difficult because the surface of the granular iron was approximately 4 ft below the water table. As groundwater was pumped out to allow for visual observation of the granular iron surface, several cave-ins occurred as trench walls became unstable. In order to overcome these difficulties, a trench box was used to support the sides of the trench while repairs were made. A 6-inch diameter Godwin pump was used to pump out the groundwater, and the Daewoo 220 hoe was used to expose the granular iron surface within the trench box. The Daewoo 130 hoe was then used to obtain granular iron/sand mix from the bucket of a front-end loader and to place the mix in the trench box onto the exposed granular iron surface.

- During initial construction, Panel 8A was not completed by the end of the day it was started. A trench profile, surveyed at the end of the day of backfill, indicated that the backfill was approximately 10 ft below the required final elevation at the time backfilling was discontinued. The next morning, trench soundings revealed that approximately 10 ft of material had settled out of the slurry and/or sloughed in from the sidewalls overnight. Magnetic separation testing on samples obtained from the material suggested that although granular iron was present, samples were not of acceptable concentrations. Repair to the top 10 ft of the panel was made by excavating an 18 inch wide panel under a PB

slurry and then backfilling with 100% granular iron (a minimum 88% granular iron mixture was required for an 18 in. wide trench in this panel).

The granular iron required to perform repairs was shipped directly from Connelly to the site by truck on the weekend prior to repair operations. Fifty-four bags, each containing 3,000 pounds of granular iron, were used to complete the repairs.

Difficulties were also encountered during the excavation and backfilling of secondary panels 1B and 1D that are adjacent to the CTW Test Section (Panel 1C) that was installed in the fall of 1999. Panels 1B and 1D were the first of the secondary panels to be installed. During construction of panels 1B and 1D, the viscosity of the slurry decreased significantly overnight and excess material either dropped out of suspension or sloughed in from the sides of the trench. The rapid degradation of the PB slurry is believed to be due to active biodegradation enhanced by the presence of significant biological activity in the subsurface in the vicinity of the primary panel. Some of the excess material was removed from the bottom of the panels and the panels were backfilled with the required amount of iron. Some question, however, remained about the iron content of the bottom few feet of these panels and additional monitoring was conducted to confirm that the difficulties with these sections did not impact the performance of the CTW in any significant way (GeoSyntec, 2001c and GeoSyntec, 2003). As a result of the difficulties with the stability of the PB slurry in Panels 1B and 1D, the construction sequence for the remaining secondary panels was modified such that secondary panels were excavated and backfilled on the same day before the slurry had time to degrade.

3.3 Relocated Waste and Trench Spoil Management

During construction of the workpad, some landfill waste was encountered and was relocated and stockpiled in a low-lying area on the top of the landfill. The relocated waste was covered with plastic sheet for the duration of CTW construction. Also, trench spoils from the CTW excavation were stockpiled daily on top of the landfill adjacent to the waste stockpiles.

Upon the completion of CTW construction, the waste and spoils were moved to the lowest elevation areas on the top of the landfill. The waste was relocated first by excavating with the Daewoo 220 hoe, loading into the Caterpillar 350 dump truck, and

hauling to the designated low areas. The trench spoils were then pushed over the top of the waste with the John Deere 750 dozer, leaving only the trench spoils exposed. The spoils were then covered with a layer of clean soil. The clean soil was obtained from sand that was intended for, but not used in, granular iron/sand mixing, and from high areas of soil on the top of the landfill.

3.4 Slurry Fluid and Sediment Management

Special management of the fluid and sediment from the slurry impoundment was required as a result of the use of a slurry preservative or Biostat, Troysan 142, which was added to increase the working life of the BP slurry. Troysan 142 contains a biocide that degrades into methyl isothiocyanate (MITC), which can be toxic to fish according to the Troysan 142 Material Safety Data Sheet (MSDS). MITC degrades through natural processes into non-toxic substances.

Samples of fluid and sediment from the slurry impound were collected on 14 September 2000 and sent to a laboratory specializing in pesticide analysis, Anresco, Inc. (Anresco) in San Francisco, CA. Anresco reported that the sediment contained 1.1 part per billion (ppb) of Dazomet and 727 ppb of MITC, while the water contained 2.0 micrograms per liter (µg/L) of Dazomet and 1,110 µg/L of MITC. Based on these test results a 100,000 gallon capacity "Modu-Tank" modular tank was ordered and shipped to the Site by truck to store the slurry. The modular tank was erected in an area near the Maple Street Site entrance. Approximately 35,000 gallons of slurry fluid in the impoundment was transferred to the modular tank using a 6-inch diameter Godwin pump and stored until tests indicated that the MITC had naturally degraded to acceptable levels. A lined basin was constructed on the top of the landfill adjacent to the spoils area to contain the sediment from the impoundment. The 60-foot by 60-foot basin was constructed with the relocated waste and spoils making one side of the basin and 2 ft high earthen berms forming the remaining 3 sides. The basin was then lined with a modular tank plastic liner, ordered and shipped to Site with the Modu-Tank used to hold the slurry from the impoundment.

After the fluid in the impoundment was pumped to the modular tank, the sediment was loaded with the Daewoo 220 excavator into the Caterpillar 350 dump truck and hauled to the lined basin. The John Deere 750 bulldozer was used to compile the sediment as it was excavated. Once all the sediment was hauled to the lined basin, the

basin was covered with plastic sheet. Soil was used to anchor the plastic sheet over the sediment. The sediment was left in the basin and allowed to degrade naturally and covered by the final cover system.

The fluid slurry in the modular tank was sampled on 23 October 2000 and subjected to analysis for MITC. Two samples of fluid were collected and found to contain 7.6 and 5.8 ug/L of MITC. The contents of the modular tank were sampled again on 2 February 2001 and found to contain 6.8 ug/L of MITC. Based on the results of sampling the EPA provided approved to discharge the water. By the time plans were made to discharge the water from the tank, the water in the tank had frozen. The wood supports for the tank were removed and the solid block of ice was allowed to melt and discharge slowly into the groundwater.

4. PERMEABLE LANDFILL COVER AND BEDROCK GROUNDWATER EXTRACTION SYSTEM CONSTRUCTION

4.1 Overview

Construction of the permeable landfill cover and the bedrock groundwater extraction and re-injection system was conducted during June, July and August of 2001 by Sevenson Environmental Services, Inc. (Sevenson). A project Kick-Off meeting was held at the Site on 6 June 2001 and a final site inspection meeting was held on 29 August 2001. The main activities conducted for the construction of these components of the remedy were as follows:

- mobilized equipment, facilities, and personnel to the Site;
- installed silt fence around construction areas and temporary fencing around construction areas;
- constructed temporary access roads;
- removed concrete rubble debris and relocated to the bank north of the landfill;
- removed asphalt piles for off-site asphalt recycling;
- removed exposed tires from landfill for off-site recycling;
- removed wood waste from top of landfill and chipped wood material in an area to the north of the landfill;
- removed existing road on the east side of the landfill;
- re-graded waste material to achieve design grading and drainage of site;
- installed a minimum of six inches of fill material and six inches of topsoil over waste disposal area;

- installed subsurface piping beneath Blackwater Road from Extraction Well BRW-1 to the north side the road;
- installed a subsurface vault for the piping and flowmeter for the extraction well;
- installed the infiltration gallery on the top of the landfill and piping from the subsurface vault to the infiltration gallery;
- installed power supply and controls for bedrock groundwater extraction pump;
- removed temporary access roads and regraded disturbed areas;
- installed access road from Blackwater Road to infiltration gallery as per design drawings;
- hydroseeded cover area;
- demobilized equipment from the Site.

4.2 Site Preparation and Cover Installation Activities

Site preparation activities were initiated at the beginning of June 2001. Sevenson mobilized equipment, facilities, and personnel to the Site during the first week of June 2001. They installed silt fence around the construction areas and temporary fencing around construction areas and constructed temporary access roads and parking areas. They removed concrete rubble debris from areas on the top of the landfill and relocated this material to the bank north of the landfill. They removed asphalt piles from the Site for off-site asphalt recycling. They removed exposed tires from landfill and stored these tires in the former quarry area to the north of the landfill pending transport off-site for recycling. They removed wood waste from top of landfill and stored this wood in the former quarry area to the north of the landfill pending chipping of wood material on-site. They removed existing road on the east side of the landfill and replaced it with a gravel road. They re-graded waste material to achieve design grading and drainage of the site and installed a minimum of six inches of fill material and six inches of topsoil over waste disposal area.

4.3 Bedrock Groundwater Extraction System Construction

The groundwater extraction well BRW-1 was installed in April 1996 to a depth of 51 feet below ground surface. A copy of the boring log for BRW-1 is included in Appendix E. Sevenson installed subsurface piping and power supply for the pump beneath Blackwater Road from extraction well BRW-1 to the north side the road. They installed a subsurface vault for the piping and flowmeter on the north side of Blackwater Road. They installed the infiltration gallery on the top of the landfill and piping from the subsurface vault to the infiltration gallery. They installed the power supply to the extraction well pump and pump controls. They installed level switches in the extraction well to control the operation of the pump. They installed a manual flow control valve to control the flowrate of groundwater from the extraction well pump in the subsurface vault. They installed an above ground Instrument Control Panel (ICP) in a lockable weather proof box located adjacent to the underground vault. They installed a flowmeter / flow totalizer to monitor the flow from the extraction well pump in the vault with a display on the Instrument Control Panel (ICP) located in the control cabinet adjacent to the vault. The subsurface vault and the control cabinet are surrounded by an 8-foot high chain link fence.

Sevenson also installed the groundwater injection system consisting of: 1) double-walled underground piping to convey groundwater from the underground vault up the hill to the infiltration gallery; 2) perforated distribution piping in the infiltration gallery; 3) an infiltration gallery filled with stone to allow groundwater to percolate into the landfill; and 4) a clean-out access point to allow access to distribution piping in the infiltration gallery.

4.4 Site Restoration

Sevenson arranged for off-site recycling of tires removed from the landfill and chipping of the wood debris. Wood debris was placed against the sand bank of the sand quarry north of the landfill. Sevenson hydroseeded the cover and demobilized equipment from the Site.

5. LANDFILL GAS VENTING TRENCH CONSTRUCTION

This section describes the construction of the LFG venting trench at the Site.

5.1 Overview

Construction of the landfill gas venting system LFGVS involved excavation of two trench segments along the eastern side of the landfill, backfilling the trench with gravel, and capping with a clay layer. The main elements of the LFGVS construction were as follows:

- mobilized equipment, facilities, and personnel;
- installed silt fence around the construction areas and placed temporary security (6-ft chain link) fence around the trench excavation areas;
- stripped the existing 1-ft thick permeable cap at the southwest corner of the landfill to serve as a contaminated soil (waste) disposal area;
- constructed temporary access roads adjacent to both sections of trench;
- excavated two trench segments to September 2001 groundwater levels (historic low), or to existing groundwater level and stockpiled spoils in clean or waste disposal areas depending on visual and photoionization detector (PID) screening results;
- placed geomembrane panels with geotextile overlay on the side of the trench furthest from the landfill;
- installed 4-in. diameter slotted vent pipes at 200-ft intervals along trench (the vents were later extended using solid pipe, approximately 10 to 12-ft above ground and had turbine ventilators installed on the top and sample ports at approximately 3 to 4-ft above ground);
- backfilled trench with gravel and graded the surface of the gravel backfill to approximately 3 ft below ground surface;

- deployed a non-woven geotextile over the gravel surface the placed/compacted a low-permeability cap;
- replaced topsoil over disturbed trench areas and hydroseeded or placed sand and gravel on areas of the trench formerly used as parking areas and roads;
- removed temporary access roads adjacent to trenches and regarded disturbed areas;
- graded the contaminated (waste) spoils at the southwest corner of the landfill to blend with adjacent grades and covered with two 6-in. thick layer of clean soil;
- planted shrubs around each of the seven vent stacks; and
- demobilized from the Site.

Panther was issued a Notice to Proceed on 11 September 2003, provided submittals starting 16 October 2003 (including a Quality Control Plan, Remedial Action Work Plan, and Erosion Control, Dust Control, and Clearing & Grubbing Plan), and began initial site preparation on 28 October 2003. A pre-construction meeting was held on 30 October 2003. LFGVS excavation and backfilling operations began on 1 November 2003 and were substantially completed on 12 December 2003. The compacted clay layer was constructed between 1 and 5 December 2003 for the southeast trench segment and between 14 and 18 December 2003 for the northeast trench segment. Grading and covering of the contaminated soil disposal area was completed on 8 January 2004. The majority of the restoration activities of the LFGVS was completed by 11 June 2004, following a winter demobilization period. A pre-final inspection was conducted on 15 June 2004.

5.2 LFGVS Construction

The proposed LFGS centerline was realigned after a pre-construction site walk-through in an effort to minimize excavation through waste. Several test pits were excavated initially along the proposed trench alignment, which indicated the limits of waste extended towards Blackwater Road. The south east portion of the trench, starting at Station 0+00, was gradually adjusted to be located at the base on an existing

embankment along Blackwater Road. Between Stations 4+25 and 6+25, the alignment was moved inward toward the landfill to avoid an existing embankment. Between Stations 15+75 and 13+25, along the northern portion of the northeast trench, a 2 to 3-ft bench was initially cut to allow for the excavator to reach target depths. Test pits also indicated waste deeper than 5 feet to the south of the existing concession stand, therefore the LFGS was moved as close to the concession stand as possible to minimize the amount of waste encountered during trench excavation.

The LFGVS was constructed by excavating and backfilling a trench using a bio-polymer slurry (guar based). Trench excavation was performed with various pieces of equipment as follows:

- Station 0+00 to 1+50 of Southeast trench – John Deere 160LC and Komatsu PC220 with 42-inch wide bucket.
- Station 1+50 to 1+90 of southeast trench – Volvo EC290BLC with 36-inch wide bucket.
- Station 1+90 to 7+25 of southeast trench – Volvo EC290BLC with 30-inch wide bucket.
- Northeast trench – Komatsu PC400LC with 30-inch wide rock bucket.

After initial soil material had been excavated from the trench, a bio-polymer slurry, a mixture of Ultra-Guar with water, was added to support the trench walls during the remaining excavation. Excavated material was transported to one of two disposal areas. Spoils containing visual waste or giving PID readings above 5 ppm were placed within the contaminated soil disposal area at the southwest corner of the landfill. Excavated soils with no visual refuse or PID readings above 5 ppm were stockpiled to the northwest of landfill in the former quarry area.

When a sufficient length of trench had been excavated and the depth was verified manually with a tape measure, 40-mil thick textured geomembrane panel with a 4 ounce per square yard non-woven geotextile cushion was lowered into the trench on the side furthest from the landfill. The geomembrane/geotextile panels were ballasted with four or five sandbags tied to the bottom of the panels. The geomembrane and geotextile were supplied by The Liner Company of Colts Neck, NJ and was manufactured by

Solmax International Inc., Varennes, Quebec, and SKAPs Inc., Pendergrass, GA, respectively.

At seven locations on approximately 200-ft intervals, prior to trench backfilling operations, a 4-inch diameter schedule 40 PVC vent pipes were installed. Each vent pipe included a slotted section of pipe extending from the bottom of trench to 3-ft below ground surface. The remainder of the vent pipe was solid PVC extending to a height of 10 to 12-ft above ground surface. The pipe was supplied by Johnson Screens, Forked River, NJ. A 16-in. diameter externally braced galvanized turbine ventilators (manufactured by Empire Ventilation Equipment Co., Inc., Long Island City, NY) were installed on each vent as well as a ¼-in diameter brass McMaster Carr sampling port.

When the geomembrane/geotextile panels and vent pipes (at selected locations) had been lowered into place, a front-end loader and excavator were then used to backfill the trench with gravel. The ¾-in. diameter gravel was supplied by Pike Industries, from their Wells, ME quarry.

A compacted clay layer was placed over the gravel backfill to limit surface water infiltration into the trench. This soil barrier layer was constructed to be 2.5 ft. high above the surface of the gravel. The compacted clay layer was constructed by first placing a separation geotextile over the gravel surface. Five lifts, each 6 inches thick (compacted), were then placed on top of the geotextile. A trench compactor, a Bomag BMP 851 padfoot compactor, was utilized to compact each lift of clay. Soil for the compacted clay layer was supplied by STS Construction of East Lebanon, ME.

Topsoil or a sand and gravel mixture was used to backfill the upper 6-inches of trench. Topsoil was placed in areas that were originally grassed. A sand and gravel mixture was used in the parking area along the eastern-most 50-ft of the southeast trench and in the road and parking area to the north of the concession stand along the northeast trench. The topsoil was then hydroseeded. Grass seed was placed on the areas adjacent to both trench sections that were used for temporary access roads. Around each gas vent, a ring of native shrubs were planted. The topsoil and shrubs were supplied by Leaver's Landscaping, Somersworth, NH. The sand and gravel mixture was composed of on-site clean trench spoils and gravel used for trench backfill.

Repairs to an existing concrete slab (adjacent to an existing canteen building) were performed by Panther prior to demobilizing from the Site. A subcontractor, DQ

Concrete Foundation and Floor, assisted with placement of concrete, supplied by Seacoast Redimix Concrete, LCC.

5.3 Relocated Waste and Trench Spoil Management

During LFGVS excavation, landfill waste was encountered and was required to be relocated in a selected area on the top of the landfill. The relocated waste was covered with a temporary plastic film for the duration of LFGVS construction. Clean trench spoils were stockpiled to the northwest of landfill in the former quarry area.

Upon the completion of LFGVS construction, the waste stockpile was compacted with a dozer and blended into the adjacent grades on top of the landfill. The graded waste was then covered with a 6-inch layer of clean soil that had been previously stripped. Some additional cover soil was required and clean trench spoils were used. A 6-inch thick layer of topsoil was then placed on top of the layer of clean cover soil. The topsoil was then hydroseeded by the City of Somersworth.

5.4 Slurry Fluid Management

Bio-slurry was mixed in a stand-alone mixing tank that transferred the mix into two 20,000 gallon storage tanks (i.e., Baker tanks) where it was mixed via recirculation until being pumped into the trench excavation, Slurry levels within the trench were typically maintained between two to three feet below grade. Due to slurry consumption rate within both the northeast and southeast trench segments, no slurry was pumped out of either trench.

The General Contractor took measures to limit the quantity of slurry excavated from the trench by cutting holes in the excavator's bucket. Trench spoils were also drained directly from the end dumps spoils by raising the end dump's bed to an angle to allow for liquids to drain out of the bed and back into the trench. Any slurry spilled from the tank or delivery hose was collected and placed directly into an open section of trench.

6. SUMMARY OF PROJECT COSTS

Table 3 provides a comparison of the actual project costs with the ROD estimate of project costs.

7. CONTACTS

This section includes the relevant contact information for the project.

The PRPs used the following contractor for the RA:

Thomas Krug, Project Manager
GeoSyntec Consultants
130 Research Lane, Suite 2
Guelph ON, Canada, N1H 3E9
519 822-2230 ext 242

The following companies analyzed samples:

Columbia Analytical Services
1 Mustard St., Suite 250
Rochester, NY, USA 14609
585-288-5380 ext. 134

The project manager for the PRPs was:
Norm Leclerc
City of Somersworth

603-692-4262 x314

The project managerS for the EPA were:

Roger Duwart (prior to December 2004) and
Michael Jasinski (after December 2004)
EPA Remedial Project Manager / New England Chief, NH/RI Superfund Section
United States Environmental Protection Agency
New England (Region 1)
1 Congress Street Suite 1100 (HBO)
Boston, MA
USA 02114-2023
(617) 918-1352 (for Mike Jasinski)

8. REFERENCES

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Tables

Table 1: Major Construction Milestones for Remedial Action

Major Activity	Date	Milestone
Bedrock Extraction Well Installation	April-1996	Installation of BRW-1
Remedial Action Design	April-1999	100% Design Approved by EPA and NHDES
	July-2000	Updated 100% Design Completed
Construction of Chemical Treatment Wall (CTW)	8-Jul-2000	Initiation of CTW Workpad Construction
	1-Aug-2000	Excavation of First CTW Panel
	11-Sep-2000	Backfilling of Final CTW Panel
	28-Sep-2000	Completion of CTW Construction Activities
Construction of Landfill Cover and Bedrock Extraction System	6-Jun-2001	Project Kick-Off Meeting and Initiation of Construction
	29-Aug-2001	Final Inspection Meeting for Cover and Bedrock Extraction
Construction of Landfill Gas (LFG) Venting System	30-Oct-2003	Pre-Construction Meeting on Site
	1-Nov-2003	Initiation of Excavation Activities for LFG Venting Trench
	12-Dec-2003	Completion of Excavation for LFG Venting Trench
	18-Dec-2003	Completion of Backfilling of LFG Venting Trench
	8-Jan-2004	Completion of Site Grading for LFG Venting Trench
	11-Jun-2004	Completion of Site Restoration for LFG Venting Trench
Pre-Final Inspection	15-Jun-2004	Pre-Final Inspection Meeting

Table 2: Summary of CTW Panels and Iron Usage

Panel	Start Location (feet)	End Location (feet)	Length of Panel (feet)	Excavation Date	Backfill Date	Number of Bags of Iron Used
1-A	0	40.96	40.96	1-Aug-00	3-Aug-00	111
1-B	40.96	79.00	38.04	14-Aug-00	15-Aug-00	122
1-C	79.00	99.22	20.22	Nov-99	Nov-99	0
1-D	99.22	134.09	34.87	15-Aug-00	16-Aug-00	78
1-E	134.09	177.22	43.13	8-Aug-00	9-Aug-00	99
2-A	177.22	211.64	34.42	17-Aug-00	17-Aug-00	99
2-B	211.64	245.16	33.52	29-Aug-00	29-Aug-00	65
2-C	245.16	278.59	33.43	30-Aug-00	30-Aug-00	72
3-A	278.59	327.9	49.31	9-Aug-00	10-Aug-00	148
3-B	327.9	377.84	49.94	18-Aug-00	18-Aug-00	182
4-A	377.84	421.95	44.11	10-Aug-00	11-Aug-00	213
4-B	421.95	460.09	38.14	21-Aug-00	22-Aug-00	152
4-C	460.09	497.97	37.88	11-Sep-00	11-Sep-00	145
5-A	497.97	529.51	31.54	23-Aug-00	24-Aug-00	88
5-B	529.51	578.53	49.02	8-Sep-00	9-Sep-00	93
5-C	578.53	614.58	36.05	24-Aug-00	25-Aug-00	82
6-A	614.98	658.39	43.41	8-Sep-00	8-Sep-00	59
6-B	658.39	695.9	37.51	25-Aug-00	26-Aug-00	81
6-C	695.9	733.28	37.38	7-Sep-00	7-Sep-00	60
7-A	733.28	774.55	41.27	26-Aug-00	27-Aug-00	65
7-B	774.55	814.06	39.51	6-Sep-00	6-Sep-00	52
8-A	814.06	863.65	49.59	28-Aug-00	28-Aug-00	126
8-B	863.65	916.35	52.7	30-Aug-00	31-Aug-00	141
TOTAL CTW LENGTH			915.95			2333

Table 3: Comparison of ROD Estimated and Actual Costs 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 RD/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 (page26) 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 1.184

*** 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

NPV - Net Present Value

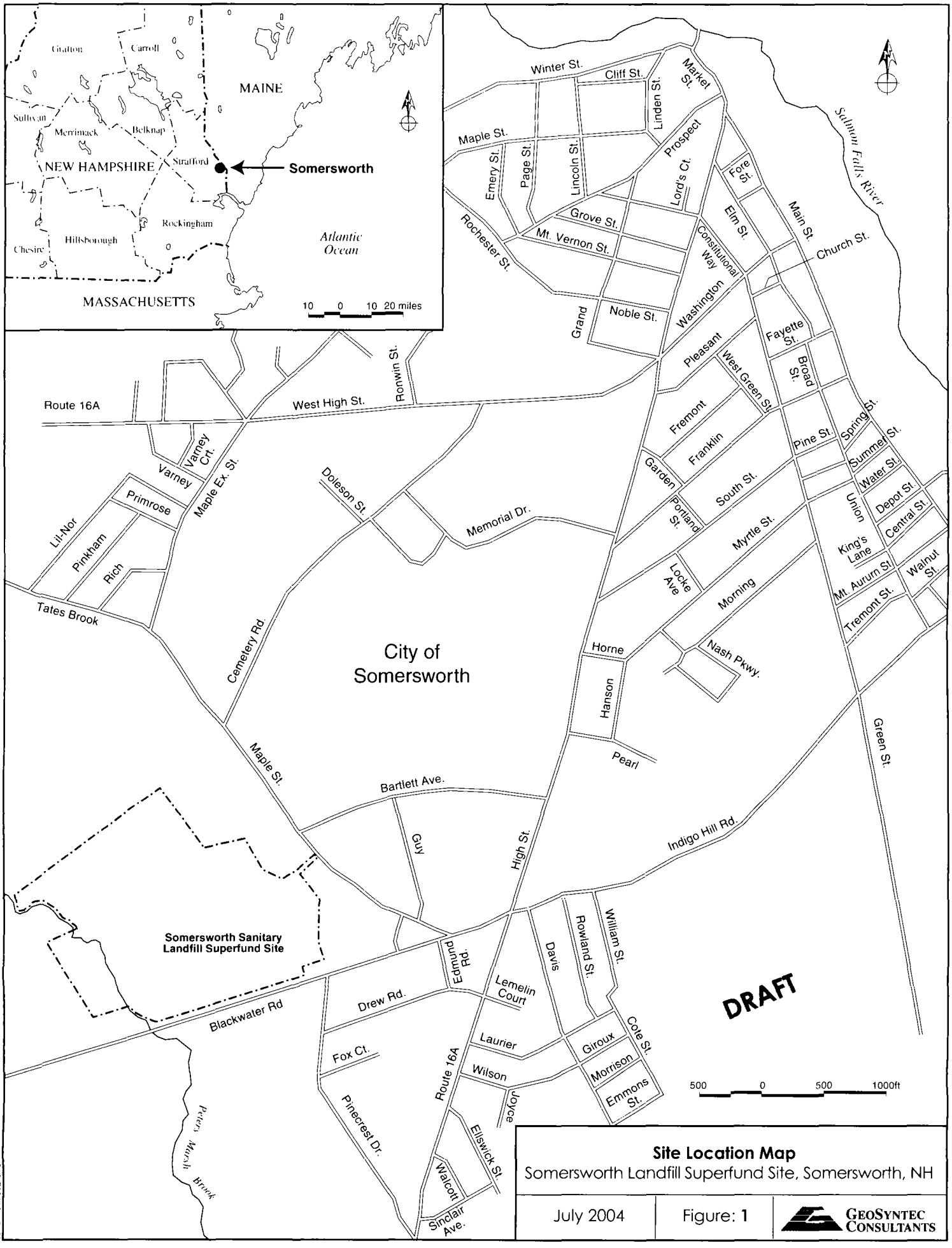
NA - Not Available

OM&M - Operations, Maintenance and Monitoring

RA - Remedial Action

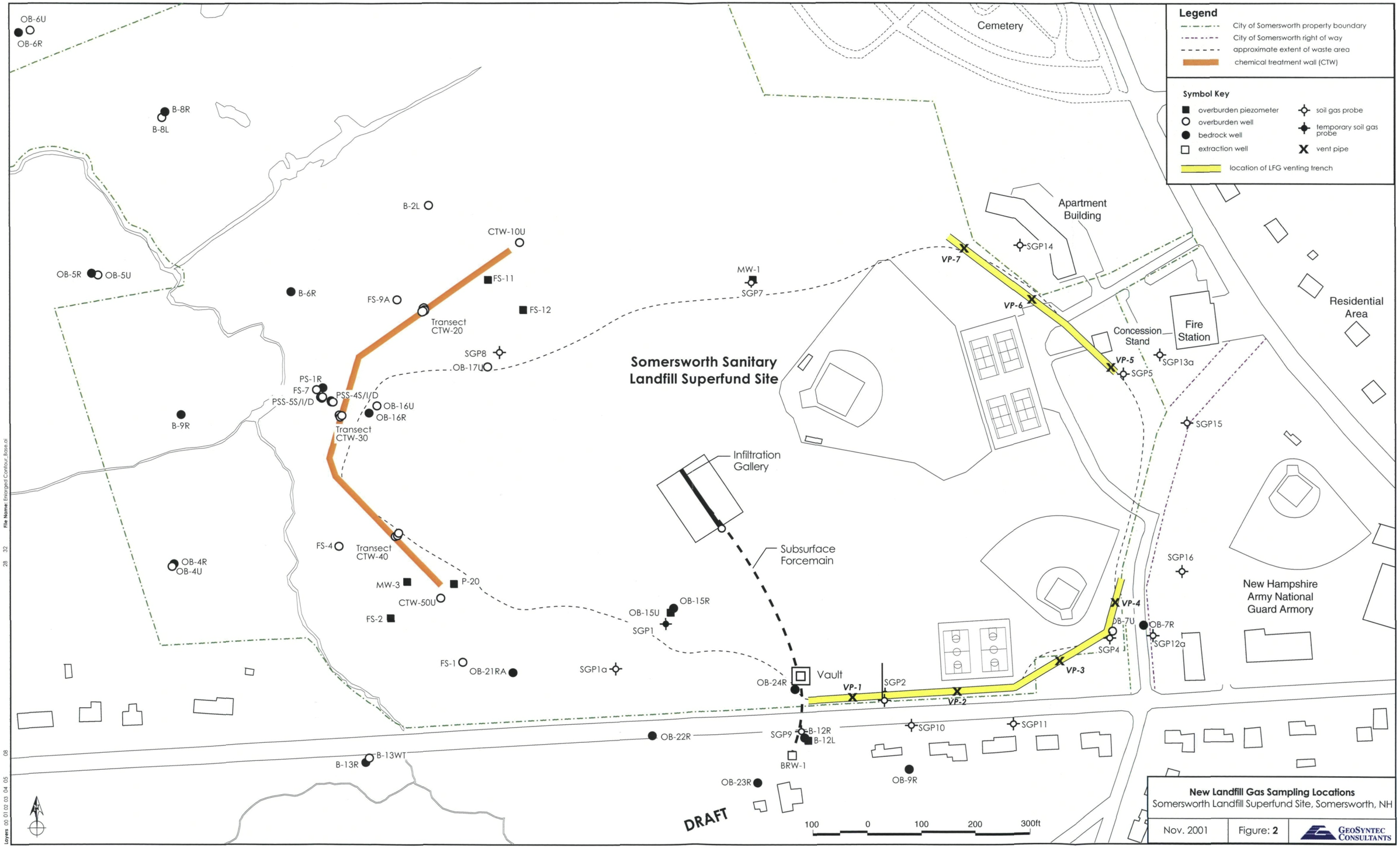
ROD - Record of Decision

Figures

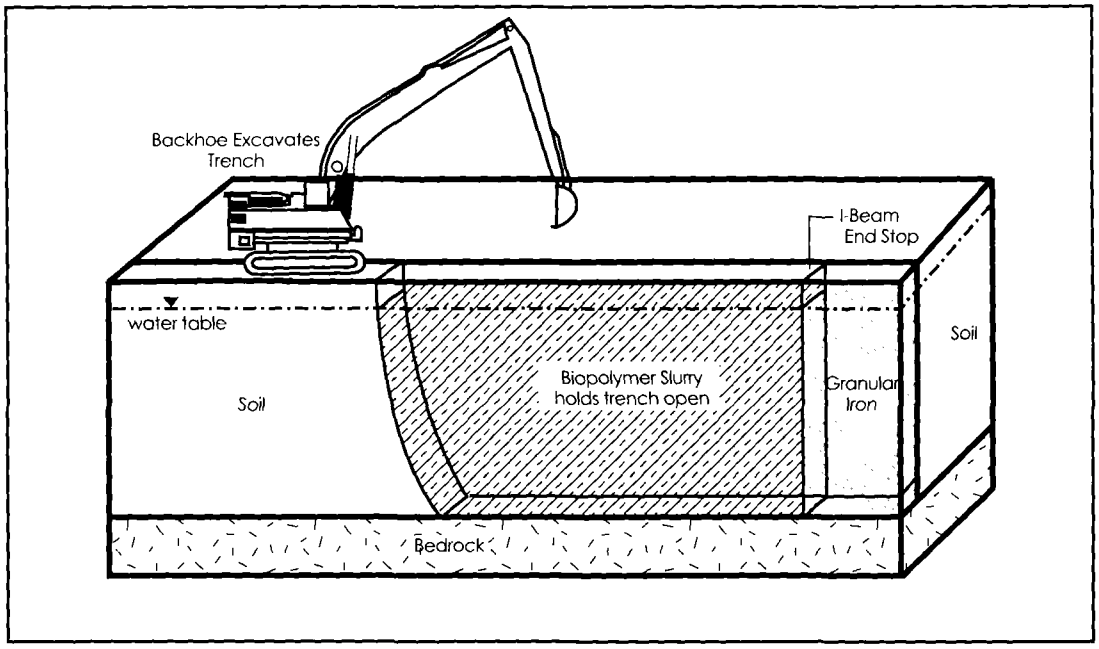


Site Location Map
Somersworth Landfill Superfund Site, Somersworth, NH

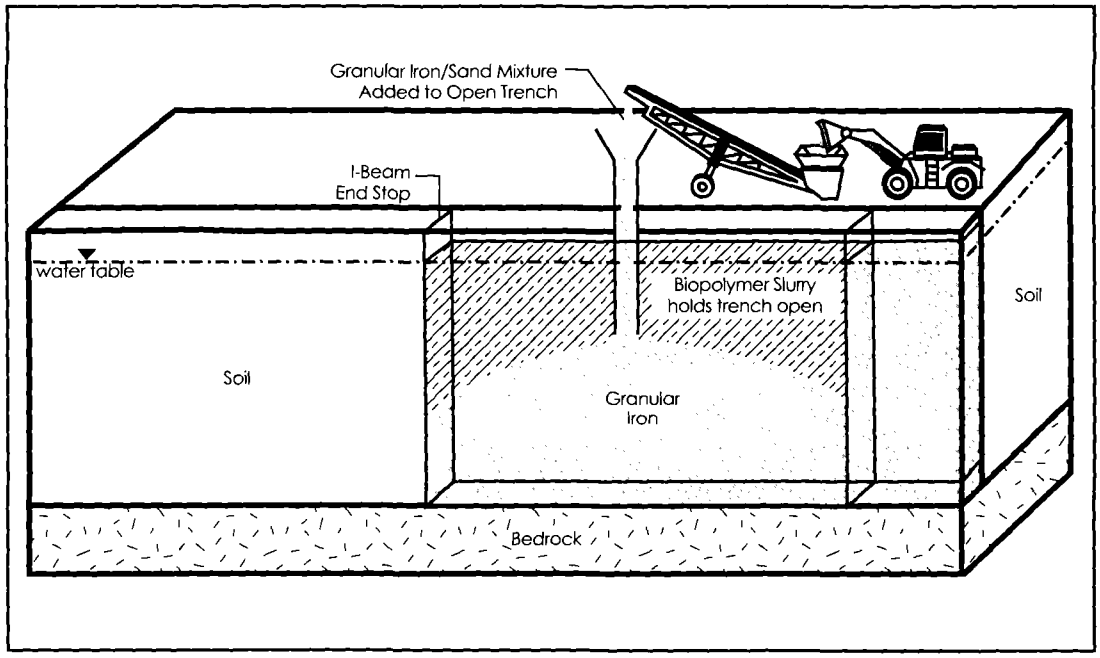
July 2004	Figure: 1	GeoSyntec Consultants


Legend
City of Somersworth property boundary
City of Somersworth right of way
approximate extent of waste area
chemical treatment wall (CTW)
Symbol Key
overburden piezometer
overburden well
bedrock well
extraction well
soil gas probe
temporary soil gas probe
vent pipe
location of LFG venting trench
Somersworth Sanitary Landfill Superfund Site
Cemetery
Apartment Building
Residential Area
Concession Stand
Fire Station
New Hampshire Army National Guard Armory
Infiltration Gallery
Subsurface Forcemain
Vault
Transect CTW-30
Transect CTW-20
Transect CTW-40
OB-6U
OB-6R
B-8R
B-8L
B-2L
CTW-10U
OB-5R
OB-5U
B-6R
FS-9A
FS-11
FS-12
MW-1
SGP7
SGP8
OB-17U
PS-1R
FS-7
PSS-5S/I/D
PSS-4S/I/D
OB-16U
OB-16R
B-9R
FS-4
OB-4R
OB-4U
MW-3
P-20
CTW-50U
FS-2
OB-15U
OB-15R
SGP1
FS-1
OB-21RA
SGP1a
OB-24R
VP-1
SGP2
VP-2
VP-3
VP-4
VP-5
VP-6
VP-7
SGP14
SGP13a
SGP5
SGP15
SGP16
SGP12a
SGP4
OB-7U
OB-7R
OB-22R
SGP9
B-12R
B-12L
SGP10
SGP11
B-13R
B-13WT
BRW-1
OB-23R
OB-9R
DRAFT
100 0 100 200 300ft
New Landfill Gas Sampling Locations
Somersworth Landfill Superfund Site, Somersworth, NH
Nov. 2001
Figure: 2
GeoSyntec Consultants
File Name: Enlarged Contour_Base.ai
Layers 00 01 02 03 04 05 08 28 32

A) Step 1 - Excavation



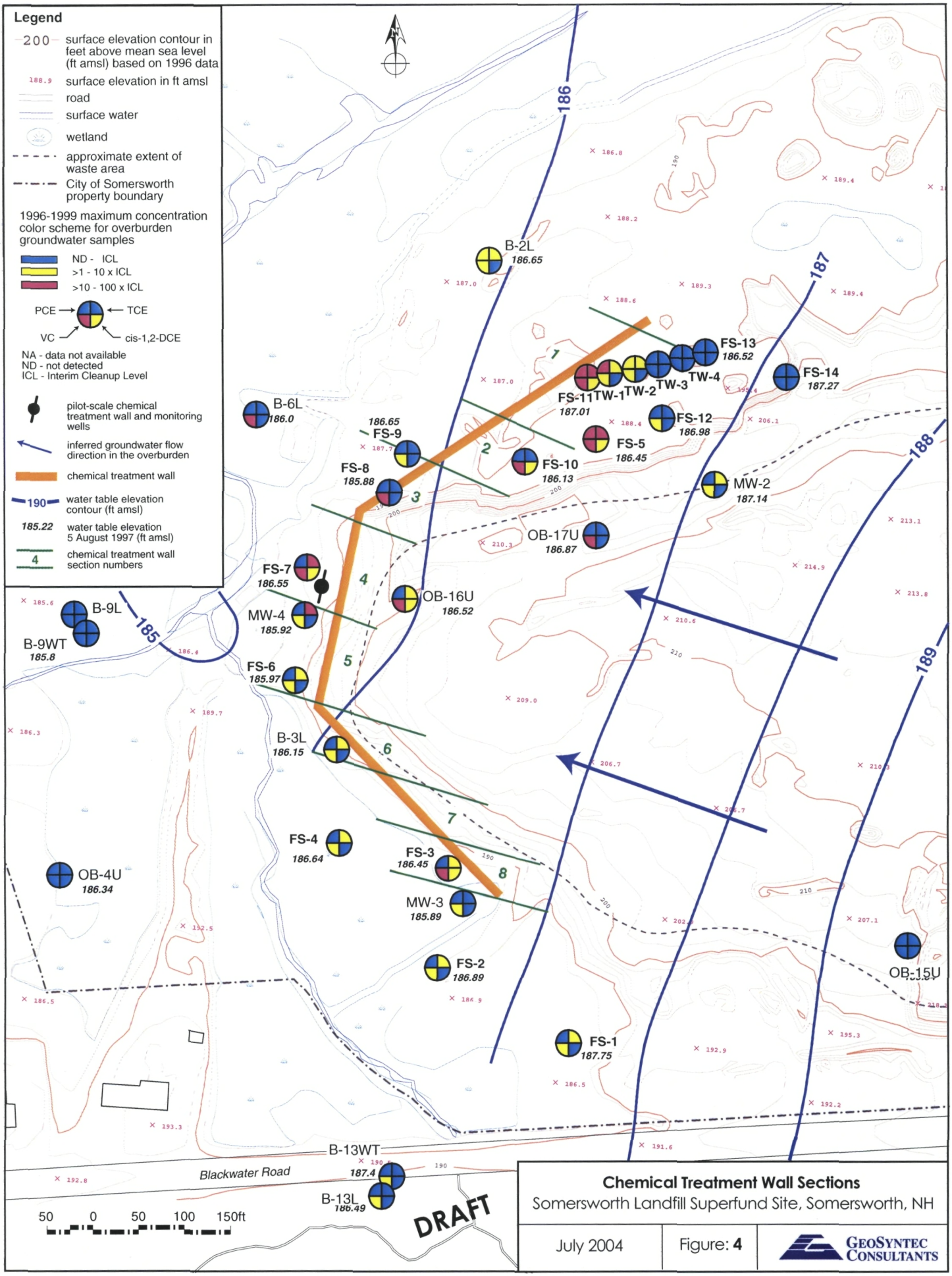
B) Step 2 - Backfilling



DRAFT

Construction Sequence for Chemical Treatment Wall

July 2004	Figure: **3**	GeoSyntec Consultants



Chemical Treatment Wall Sections
Somersworth Landfill Superfund Site, Somersworth, NH

July 2004 | Figure: **4** | GeoSyntec Consultants

APPENDIX A

AS BUILT DRAWINGS FOR CTW

CONSTRUCTION DRAWINGS

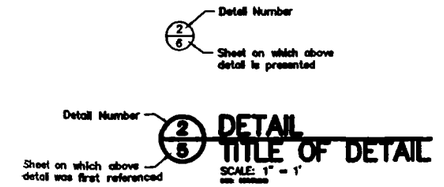
SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

SOMERSWORTH, NEW HAMPSHIRE

PREFERRED REMEDIAL ACTION
CHEMICAL TREATMENT WALL COMPONENT
AS-BUILT DRAWINGS

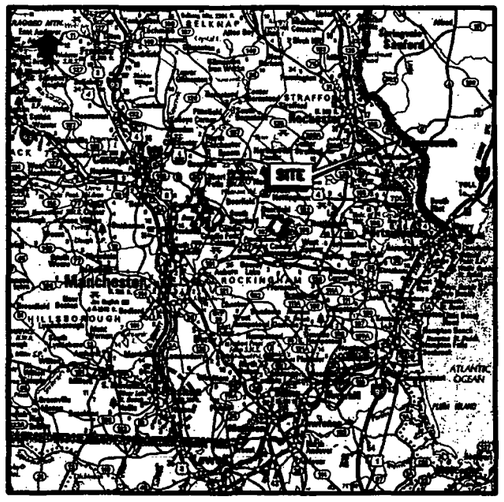
JULY, 2004

DETAIL IDENTIFICATION LEGEND



Example: Detail Number 2 presented on Sheet No. 6 was referenced for the first time from Sheet No. 5.

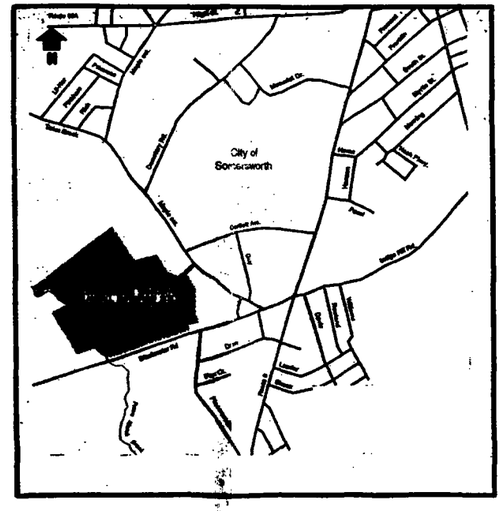
Note: Above system also applies to section identifications.



LOCATION MAP
0 10 MILES
SCALE

LIST OF DRAWINGS

DRAWING	DESCRIPTION
1	TITLE SHEET
2	PRE-CONSTRUCTION SITE CONDITIONS
3	SITE PLAN
4	COVER GRADING PLAN
5	AS-BUILT CTW PLAN AND PROFILE
6	CTW DETAILS
7	SURFACE-WATER MANAGEMENT DETAILS
8	GROUNDWATER EXTRACTION/RE-INJECTION SYSTEM DETAILS
9	GENERAL DETAILS



VICINITY MAP
0 1000 FT.
SCALE

100% DESIGN

PREPARED FOR:

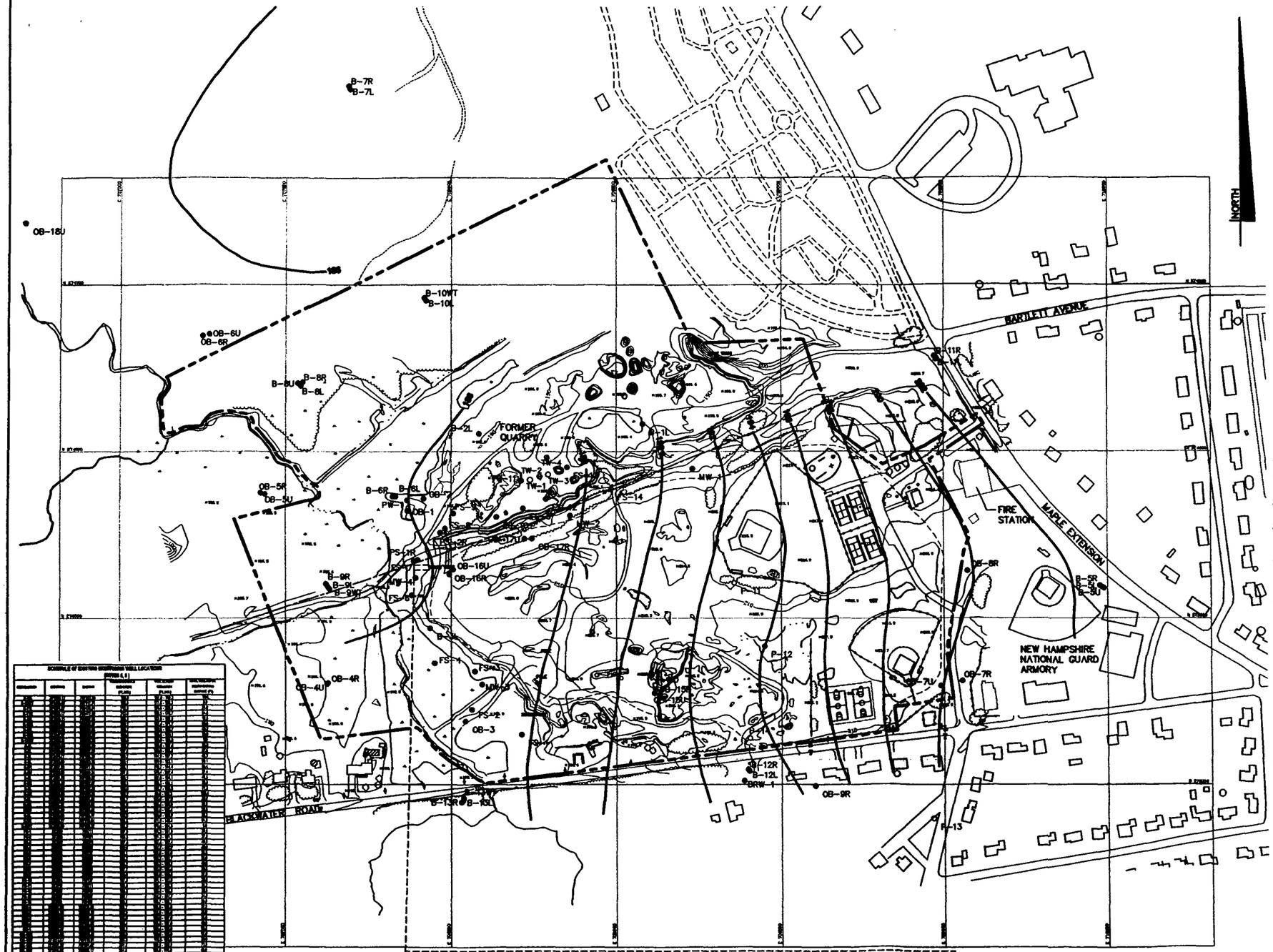
THE SOMERSWORTH LANDFILL SITE GROUP

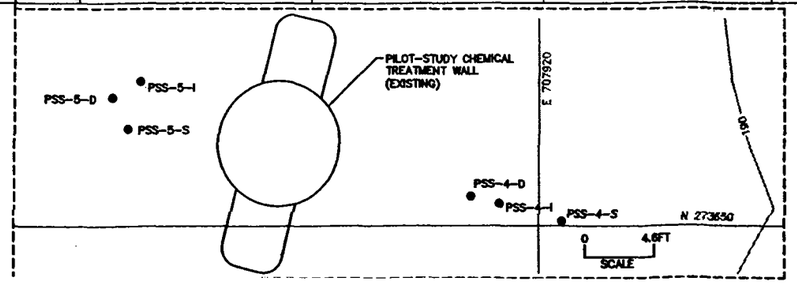
PREPARED BY:

GEOSYNTEC CONSULTANTS

130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3
(519) 822-2230

PROJECT NUMBER TR0001-01
FILE NUMBER 0001A001
DRAWING NUMBER 1 OF 9
REVISION 0





LEGEND

- 200 — OVERBURDEN PIEZOMETRIC SURFACE (FEET)
- 210 — EXISTING GROUND ELEVATION (FEET)
- 213.1 — EXISTING SPOT ELEVATION (FEET)
- APPROXIMATE PROPERTY BOUNDARY (NOTE 3)
- PAVED ROAD
- UNPAVED ROAD
- WATER LINE
- TREELINE
- APPROXIMATE EXTENT OF WASTE (NOTE 3)
- FENCE
- NATURAL GAS PIPELINE (NOTES 3,4)
- UTILITY POLE
- MONITORING WELL (NOTE 5)
- WETLANDS

NOTES:

1. TOPOGRAPHIC MAP AND RELATED SITE FEATURES COMPILED BY EASTERN TOPOGRAPHICS, INC. WOLFBORO, NEW HAMPSHIRE, BASED ON AERIAL PHOTOGRAPHY TAKEN IN FALL 1996.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (MSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
3. LOCATIONS OF PROPERTY BOUNDARY, NATURAL GAS PIPELINE, AND EXTENT OF WASTE BOUNDARY ARE APPROXIMATE, AND WERE TAKEN FROM FIGURE 1.2 OF THE SEPTEMBER 1998 CONCEPTUAL DESIGN REPORT, PREPARED BY BEAK INTERNATIONAL, INC., GUELPH, ONTARIO.
4. GAS PIPELINE OWNER, NORTHERN UTILITIES, INC., HAS INDICATED THAT AN ACTIVE GAS PIPELINE AND ABANDONED GAS PIPELINE EXIST SIDE-BY-SIDE ALONG THE APPROXIMATE LOCATION SHOWN ON THIS DRAWING. CONTRACTOR IS RESPONSIBLE FOR CONTACTING NORTHERN UTILITIES AT (603)436-0310 TO LOCATE THESE GAS PIPELINES.
5. GROUNDWATER MONITORING WELL LOCATIONS TABULATED TO THE NEAREST 0.01-FT LOCATION AND SHOWN ON THIS DRAWING WERE TAKEN FROM JULY 1998 DESIGN INVESTIGATION REPORT FOR THE PILOT STUDY AND SITE GROUNDWATER MONITORING PROGRAM, REMEDIAL DESIGN FOR PREFERRED REMEDIAL ACTION AT THE SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE, PREPARED BY BEAK INTERNATIONAL, INC.
6. OVERBURDEN PIEZOMETRIC SURFACE (I.E., WATER TABLE) IS APPROXIMATE AND SHOWS CONTOURS FROM 28 APRIL 1998. SURFACE WAS TAKEN FROM FIGURE 5.4 OF THE JUNE 1998 DESIGN INVESTIGATION REPORT FOR THE PRE-PILOT HYDROGEOLOGICAL AND GEOTECHNICAL INVESTIGATION, PREPARED BY BEAK INTERNATIONAL, INC. ADDITIONAL INFORMATION ON THE SITE HYDROGEOLOGY (E.G., WATER TABLE ELEVATIONS, TOP OF BEDROCK ELEVATIONS, ETC.) IS INCLUDED WITH THE CONTRACT DOCUMENTS. CONTRACTOR MAY PERFORM SITE INVESTIGATION AT THEIR OWN EXPENSE TO FURTHER DEFINE THE HYDROGEOLOGIC CONDITIONS THAT MAY BE ENCOUNTERED.
7. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF EXISTING CONDITIONS SHOWN ON THIS DRAWING.
8. WELLS OB-18U AND OB-20U ARE LOCATED BEYOND THE MAPPING LIMITS SHOWN ON THIS DRAWING.

150 75 0 150 300
SCALE IN FEET

GeoSyntec Consultants
130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

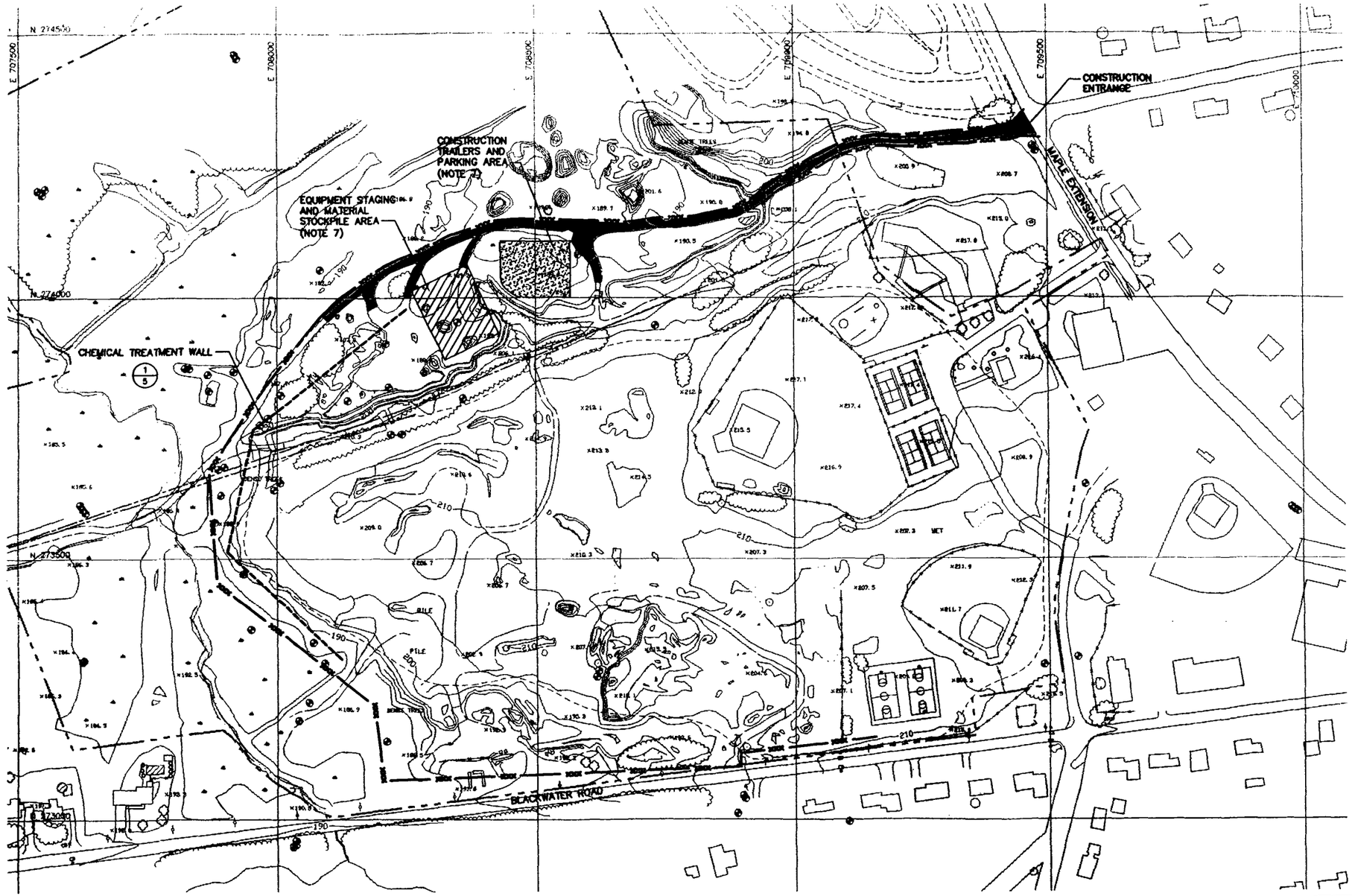
TITLE: PRE-CONSTRUCTION SITE CONDITIONS

MARK	DATE	REVISION	BY	APPROVED
3	JULY 2004	TITLE BLOCK CHANGE	MR	TK
2	APRIL 2000	CHANGED LOCATION OF FS-11	MDB	TK
1	APRIL 1999	NO CHANGES TO THIS DRAWING	SMB	JFB

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT BIDDING OR CONSTRUCTION, UNLESS SEALED.

DATE: APRIL 1999	SCALE: 1" = 150'
DESIGNED: SMB	JOB NO.: TR0001-01
DRAWN BY: JW	FILE NO: 0001B002
CHECKED BY: SMB	REVISION: D
REVIEWED BY: TK	DRAWING NO: 2 OF 9
APPROVED BY: JFB	

100% DESIGN



NORTH

LEGEND

- 210 — EXISTING GROUND ELEVATION (FEET)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING WATER LINE
- APPROXIMATE EXTENT OF EXISTING WASTE
- EXISTING FENCE
- EXISTING NATURAL GAS PIPELINE
- EXISTING UTILITY POLE
- EXISTING MONITORING WELL
- EXISTING WETLANDS (NOTE 6)
- PROPOSED CONSTRUCTION ACCESS ROAD (NOTE 8)
- PROPOSED SILT FENCE (NOTE 9)

100 50 0 100 200
SCALE IN FEET

NOTES:

1. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (MSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
2. EXISTING CONDITIONS TAKEN FROM DRAWING 2.
3. CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING SURVEY CONTROL AT THE SITE PRIOR TO CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF EXISTING SITE CONDITIONS, AND SHALL PERFORM PRE-CONSTRUCTION SURVEY AS FURTHER DESCRIBED IN THE SPECIFICATIONS. CONTRACTOR SHALL LOCATE AND PROVIDE CLEARANCE FOR ALL ABOVE-GROUND AND UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. THE GAS PIPELINE OWNER, NORTHERN UTILITIES, INC., MAY BE REACHED AT (603)436-0310.
5. ANY EXISTING FACILITY OR SITE FEATURE, (E.G., NATURAL GAS PIPELINE, GROUNDWATER WELLS, FENCING, ETC.), DAMAGED BY THE CONTRACTOR SHALL BE RESTORED OR REPLACED TO THE SATISFACTION OF THE SITE GROUP. THE CONTRACTOR SHALL BEAR THE ENTIRE COST OF RESTORATION AND/OR REPLACEMENT. CONSTRUCTION ACTIVITIES ADJACENT TO THESE FEATURES SHALL BE AS DESCRIBED IN THE SPECIFICATIONS.
6. WETLAND DELINEATION TO BE PERFORMED BY THE SITE GROUP PRIOR TO CONSTRUCTION. BASED ON THE FINDINGS OF THE WETLAND DELINEATION, THE SITE GROUP WILL UPDATE THE DRAWINGS AND SPECIFICATIONS TO ADDRESS WETLANDS MITIGATION/RESTORATION (IF APPLICABLE), AND SUBMIT THE PLANS TO THE NEW HAMPSHIRE WETLANDS BUREAU. CONTRACTOR WILL BE PROVIDED WITH WETLAND DELINEATION PRIOR TO CONSTRUCTION. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL MARK THE WETLAND LIMITS WITH WARNING TAPE, AND MARKING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
7. CONTRACTOR'S FACILITIES, MATERIAL STOCKPILES, STAGING AREAS, AND STORAGE AREAS SHALL BE LOCATED AS SHOWN ON THIS DRAWING AND DESCRIBED IN THE CONTRACT DOCUMENTS, UNLESS PRIOR APPROVAL IS OBTAINED BY THE SITE GROUP. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL SUCH AREAS DURING CONSTRUCTION AND FOR CLEANUP/RESTORATION OF SUCH AREAS AFTER CONSTRUCTION.
8. CONTRUCTION TRAFFIC ACCESS TO THE SITE SHALL BE RESTRICTED TO THE SITE ENTRANCE ON MAPLE EXTENSION AS SHOWN ON THIS DRAWING, UNLESS OTHERWISE APPROVED BY THE SITE GROUP. CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION/MAINTENANCE OF THE CONSTRUCTION ACCESS ROAD AND ANY OTHER TEMPORARY ACCESS ROADS NECESSARY FOR CONSTRUCTION. LOCATIONS OF TEMPORARY ACCESS ROADS SHALL BE ONLY AS APPROVED BY THE SITE GROUP.
9. STORM-WATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL FEATURES SHALL BE ESTABLISHED BY THE CONTRACTOR IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REQUIREMENTS AND THE SPECIFICATIONS. THE FEATURES SHALL BE INSTALLED BY THE CONTRACTOR AROUND AND DOWN-GRADIENT OF AREAS TO BE DISTURBED PRIOR TO CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR AS NEEDED DURING AND AFTER CONSTRUCTION IN ACCORDANCE WITH THE SPECIFICATIONS.

100% DESIGN

GeoSyntec Consultants
130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

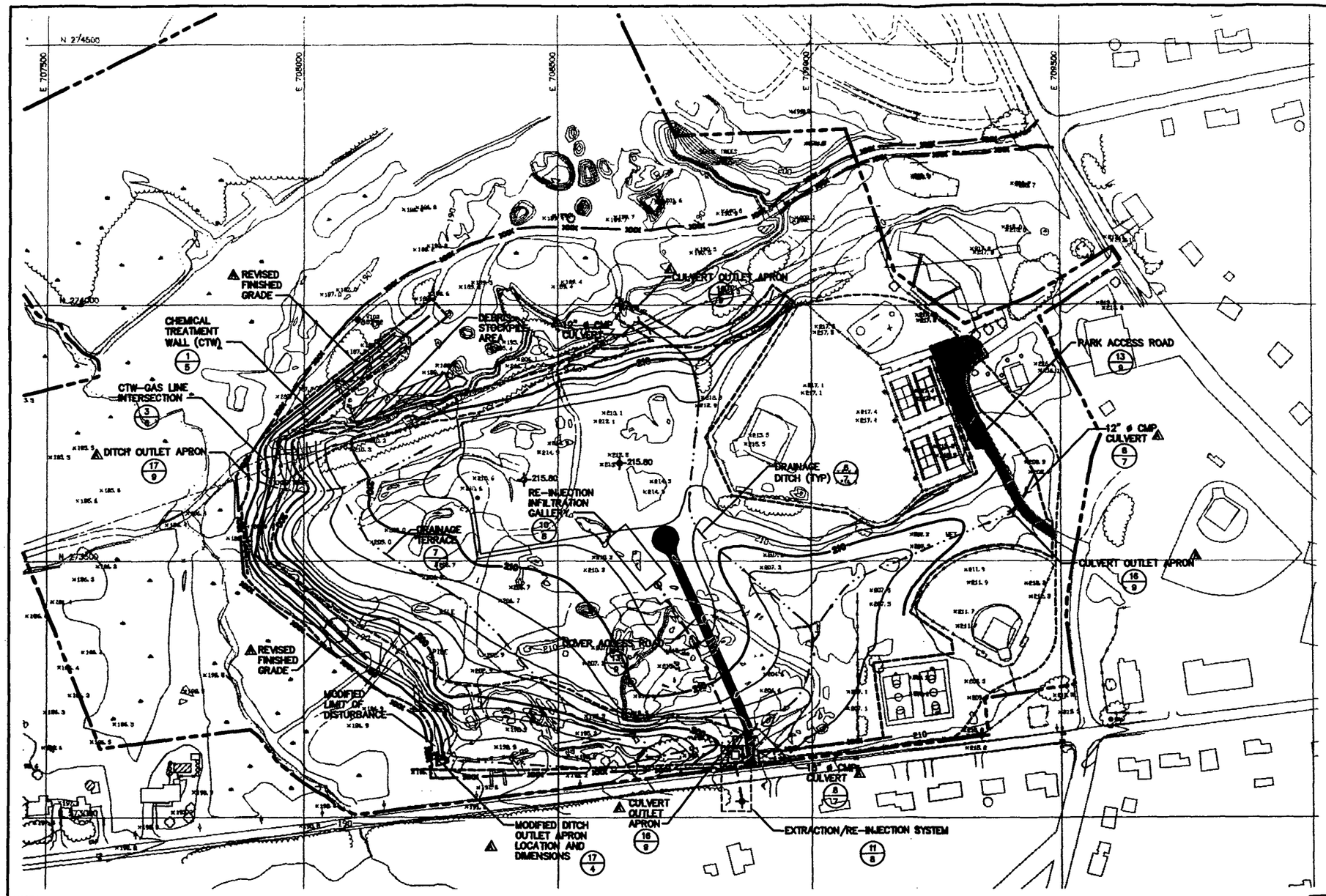
WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: SITE PLAN

MARK	DATE	REVISION	BY	APPROVED
1	JULY 2004	TITLE BLOCK CHANGE	MR	TK
2	APRIL 2000	CTW EXTENDED 75 FT. NE	WDB	TK
3	APRIL 1999	NO CHANGES TO THIS DRAWING	SMG	JFB

THIS DRAWING MAY NOT BE USED FOR PURPOSES OTHER THAN CONSTRUCTION UNLESS SEALED.

DATE: APRIL 1999 | SCALE: 1" = 100'
DESIGNED BY: SMG | JOB NO.: TR0001-01
DRAWN BY: JW | FILE NO.: 0001B003
CHECKED BY: MJM | REVISION: D
REVIEWED BY: TK
APPROVED BY: JFB | DRAWING NO.: 3 OF 9



LEGEND

- PROPOSED FINISHED GRADE (FEET)
- EXISTING GROUND ELEVATION (FEET)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING WATER LINE
- APPROXIMATE EXTENT OF EXISTING WASTE
- EXISTING FENCING
- EXISTING NATURAL GAS PIPELINE (NOTE 3)
- EXISTING UTILITY POLE
- EXISTING MONITORING WELL
- EXISTING WETLANDS
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED EXTRACTION/RE-INJECTION FORCEMAIN (NOTE 13)
- PROPOSED COVER/PARK ACCESS ROAD
- PROPOSED CHEMICAL TREATMENT WALL (CTW)
- PROPOSED DRAINAGE DITCH/TERRACE FLOW DIRECTION
- PROPOSED SILT FENCE (NOTE 4)
- PROPOSED FENCE (NOTE 16)

NORTH

100 50 0 100 200
SCALE IN FEET

NOTES:

1. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (MSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
2. ANY EXISTING FACILITY OR SITE FEATURE, (E.G., NATURAL GAS PIPELINE, GROUNDWATER WELLS, FENCING, ETC.), DAMAGED BY THE CONTRACTOR SHALL BE RESTORED OR REPLACED TO THE SATISFACTION OF THE SITE GROUP. THE CONTRACTOR SHALL BEAR THE ENTIRE COST OF RESTORATION AND/OR REPLACEMENT. CONSTRUCTION ACTIVITIES ADJACENT TO THESE FEATURES SHALL BE AS DESCRIBED IN THE SPECIFICATIONS.
3. CONTRACTOR SHALL NOTIFY NORTHERN UTILITIES, INC., AT (603)436-0310 AND THE ENGINEER 3-DAYS PRIOR TO PERFORMING ANY EXCAVATION WITHIN 10-FT OF THE NATURAL GAS PIPELINE. ALL SUCH WORK SHALL BE CONDUCTED ONLY UNDER THE SUPERVISION OF A NORTHERN UTILITIES, INC. REPRESENTATIVE.
4. STORM-WATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL FEATURES SHALL BE ESTABLISHED BY THE CONTRACTOR IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REQUIREMENTS AND THE SPECIFICATIONS. THE FEATURES SHALL BE INSTALLED BY THE CONTRACTOR AROUND AND DOWN-GRADIENT OF AREAS TO BE DISTURBED PRIOR TO CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR AS NEEDED DURING AND AFTER CONSTRUCTION IN ACCORDANCE WITH THE SPECIFICATIONS.
5. PROPOSED CONTOURS AND CONSTRUCTION CONTROL POINTS SHOWN ON THIS DRAWING REPRESENT FINISHED GRADE (I.E., TOP OF TOPSOIL LAYER). THE CONTRACTOR SHALL ALSO USE THE INFORMATION PRESENTED ON THIS DRAWING TO ACHIEVE THE REQUIRED SUBGRADE GRADES (I.E., BOTTOM OF COVER SYSTEM GRANULAR LAYER) UPON WHICH THE COVER SYSTEM WILL BE CONSTRUCTED.
6. CONSTRUCTION CONTROL POINTS ARE PROVIDED TO ASSIST THE CONTRACTOR AND FOR AS-BUILT VERIFICATION PURPOSES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACHIEVE THE FINISHED GRADES AS REPRESENTED BY THE CONTOURS SHOWN ON THIS DRAWING, BETWEEN ALL CONSTRUCTION CONTROL POINTS.
7. LIMIT OF DISTURBANCE SHOWN ON THIS DRAWING SHOULD BE CONSIDERED APPROXIMATE AND SHALL BE FIELD-LOCATED BY THE CONTRACTOR AS APPROVED BY SITE GROUP AND ENGINEER DURING CONSTRUCTION.
8. CLEARED TREES, STUMPS, AND VEGETATION SHALL BE CHIPPED AND PLACED AS MULCH ON-SITE AS DIRECTED BY THE SITE GROUP. UNDER NO CIRCUMSTANCES SHALL TREES, STUMPS, BRANCHES, OR OTHER ORGANIC MATERIAL BE PLACED WITHIN THE COVER SYSTEM LIMITS.
9. SURFACIAL CONSTRUCTION/DEMOLITION DEBRIS (E.G., CONCRETE, ASPHALT, BRICKS, ETC.) SHALL BE MOVED AND GRADED AS NECESSARY TO ACHIEVE THE REQUIRED COVER GRADES. DEBRIS MAY BE PLACED IN FILL AREAS PROVIDED THAT IT MEETS OR IS MODIFIED TO MEET THE MATERIAL REQUIREMENTS GIVEN IN THE SPECIFICATIONS. DEBRIS NOT MEETING THE FILL MATERIAL REQUIREMENTS, SUCH AS LARGE CHUNKS, SHALL BE STOCKPILED BY THE CONTRACTOR IN THE DESIGNATED AREA SHOWN ON THE DRAWINGS UNLESS OTHERWISE APPROVED BY THE SITE GROUP.
10. CONTRACTOR SHALL REMOVE PAVED ROAD AND PARKING LOT (PARK ACCESS ROAD) WITHIN THE LIMIT OF DISTURBANCE AS SHOWN ABOVE. PAVEMENT SHALL BECOME THE CONTRACTOR'S PROPERTY FOR OFF-SITE RECYCLING IN ACCORDANCE WITH NHDES REGULATIONS. PAVEMENT SHALL NOT BE DISPOSED OF ON-SITE.
11. EXISTING FENCE WITHIN THE LIMIT OF DISTURBANCE SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. CONTRACTOR SHALL NOT DISTURB OR DAMAGE EXISTING FENCING OUTSIDE THE LIMIT OF DISTURBANCE.
12. AREAS REQUIRING CUT TO ACHIEVE THE REQUIRED SUBGRADE ELEVATIONS SHALL BE PROOF-ROLLED PRIOR TO CONSTRUCTION OF THE COVER SYSTEM. AREAS REQUIRING FILL TO ACHIEVE THE REQUIRED SUBGRADE ELEVATIONS SHALL BE FILLED WITH STRUCTURAL FILL IN ACCORDANCE WITH THE SPECIFICATIONS.
13. ALIGNMENT OF PROPOSED FORCEMAIN IS APPROXIMATE, AND MAY BE MODIFIED SLIGHTLY BASED ON FIELD CONDITIONS WITH PRIOR APPROVAL OF THE SITE GROUP. CONTRACTOR SHALL PRESSURE TEST FORCEMAIN IN ACCORDANCE WITH THE SPECIFICATIONS PRIOR TO BACKFILLING. TRENCHING SHALL COMPLY WITH ALL NHDOT AND OSHA REQUIREMENTS.
14. RIPRAP OUTLET APRONS SHALL BE AS SHOWN ON DRAWING 9.
15. CONTRACTOR IS RESPONSIBLE FOR LOCATING UTILITIES AND COORDINATING TRAFFIC CONTROL FOR FORCEMAIN INSTALLATION ACROSS BLACKWATER ROAD. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS NEEDED TO PERFORM THIS WORK.
16. CHAIN LINK FENCE AROUND CONCRETE VAULT AND EXTRACTION/RE-INJECTION CONTROL SYSTEM SHALL BE 7-FT HIGH FENCING WITH BARBED WIRE, AND SHALL CONFORM TO NHDOT SECTION 607. FENCING SHALL INCLUDE A 12-FT WIDE GATE ALONG EAST SIDE.

100% DESIGN

GeoSyntec Consultants
130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

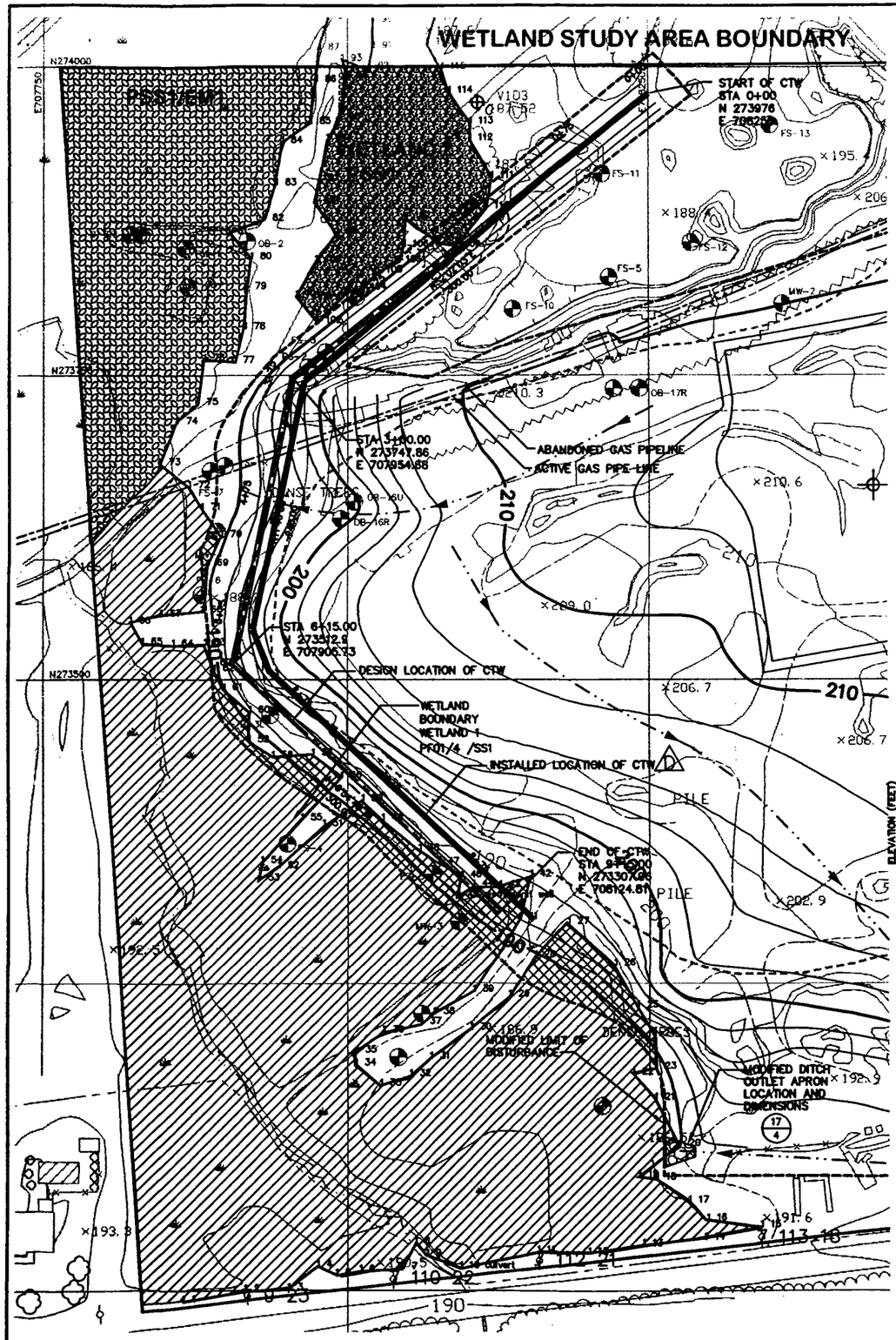
PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: COVER GRADING PLAN

MARK	DATE	REVISION	BY	APPROVED
1	JULY 1998	TITLE BLOCK CHANGE	MR	TK
2	APRIL 1999	CTW EXTENDED 70 FT. NE	MDB	TK
3	APRIL 1999	RESPONSE TO MARCH 1999 MEPA COMMENTS #8, 28, 31, 33 AND 34.	BMD	JFB

DATE: APRIL 1999	SCALE: 1" = 100'
DESIGNED BY: SMD	JOB NO.: TR0001-01
DRAWN BY: JW	FILE NO.: 0001B004
CHECKED BY: MJM	REVISION: D
REVIEWED BY: TK	DRAWING NO.: 4 OF 9
APPROVED BY: JFB	



1/3 PLAN CTW
SCALE: 1" = 50'

WETLAND BOUNDARY DELINEATED BY:
NORMANDEAU ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS
NAI # 16161.000

SCHEDULE OF IRON REQUIREMENTS FOR CTW SEGMENTS

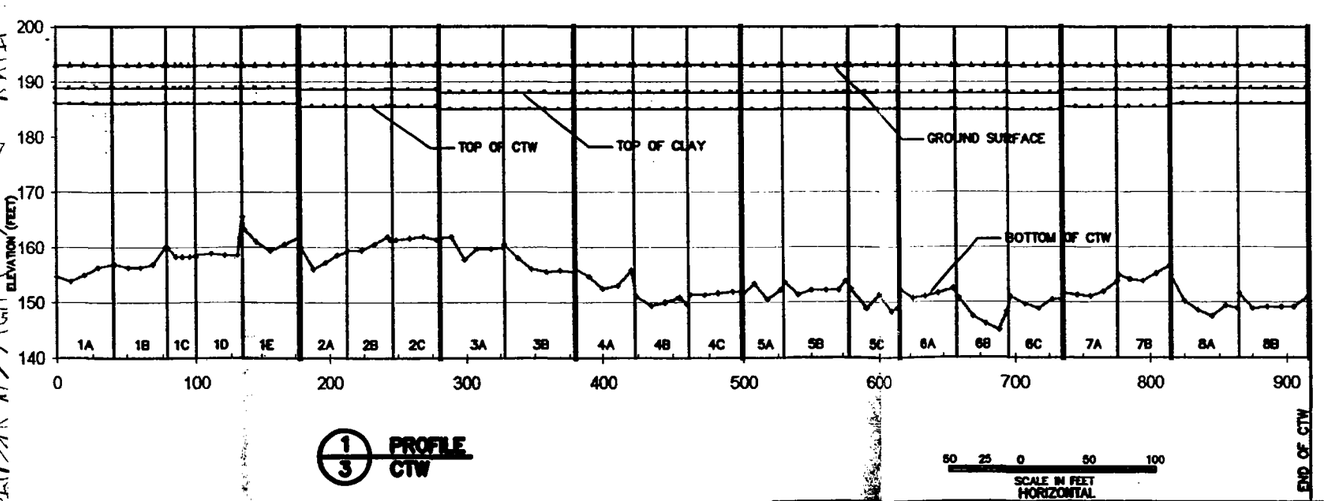
SEGMENT NO.	BEGINNING STATION	ENDING STATION	SEGMENT LENGTH (FT)	APPROXIMATE WEIGHT OF IRON REQUIRED IN SEGMENT (TONS)	PERCENT IRON (BY WEIGHT) FOR 2-FT WIDE CTW	PERCENT IRON (BY WEIGHT) FOR 3-FT WIDE CTW	PERCENT IRON (BY WEIGHT) FOR 4-FT WIDE CTW
1	0+00	1+75	175	715	95%	71%	57%
2	1+75	2+75	100	322	80%	60%	47%
3	2+75	3+75	100	439	94%	71%	57%
4	3+75	4+95	120	819	NP	87%	71%
5	4+95	6+15	120	446	74%	56%	43%
6	6+15	7+15	100	223	50%	38%	28%
7	7+15	8+15	100	220	49%	36%	27%
8	8+15	9+15	100	365	72%	53%	42%

NOTE: IRON PERCENTAGES BASED ON IRON DENSITY OF 160 lb/ft^3 AND SAND DENSITY OF 100 lb/ft^3. THESE DENSITIES SHALL BE VERIFIED PRIOR TO CONSTRUCTION AND THE REQUIRE PERCENTAGES ADJUSTED ACCORDINGLY.

NP = NOT POSSIBLE

NOTES:

1. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (MSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
2. WETLAND BOUNDARIES WITHIN THE WETLAND STUDY AREA WERE DELINEATED BY NORMANDEAU ASSOCIATES INC., BEDFORD, NH ON MAY 11 AND 12, 1999, FOLLOWING THE 1987 US ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL.



1/3 PROFILE CTW

SCALE IN FEET HORIZONTAL

LEGEND

- WETLAND BOUNDARY
- AREA OF IMPACTED WETLAND
- PF01/4 /SS1 PALUSTRINE FORESTED/SCRUB SHRUB
- PSS1 PALUSTRINE SCRUB SHRUB
- PSS1/EM1 PALUSTRINE SCRUB SHRUB/EMERGENT

100% DESIGN

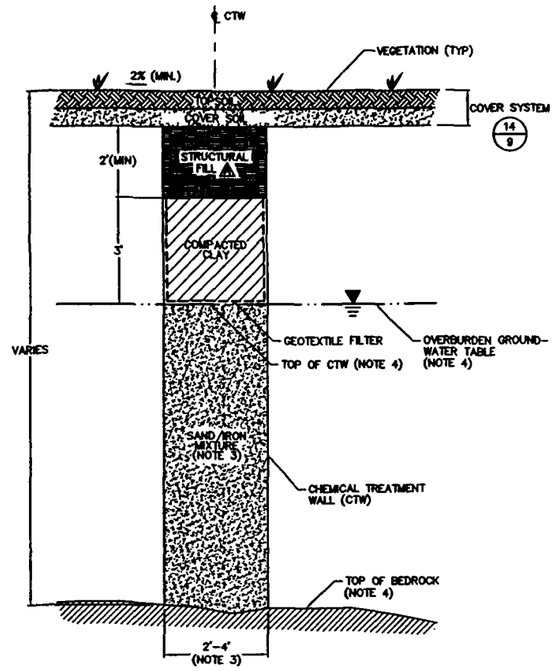
GeoSyntec Consultants
130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP
CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION
SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

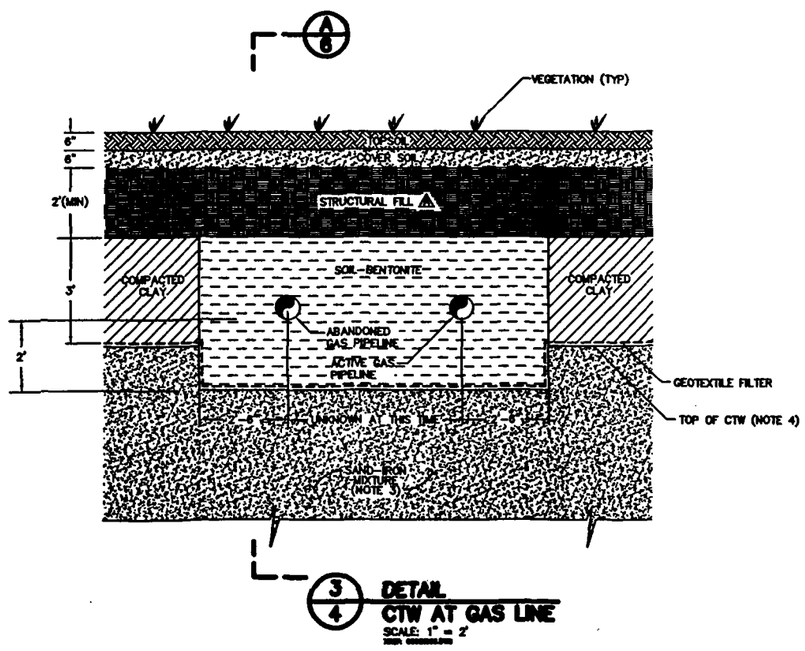
PROJECT
WORK
TITLE: AS-BUILT CTW PLAN AND PROFILE

REVISIONS		BY	APPROVED
4	AS-BUILT	MR	TK
3	WETLAND INFORMATION ADDED	MR	TK
2	CTW SEGMENTS ADJUSTMENTS, ASH REMEDIATIONS REVISED	MR	TK
1	RESPONSE TO MARCH 1999 USEPA COMMENT NO'S 6 AND 21	BMS	JFB

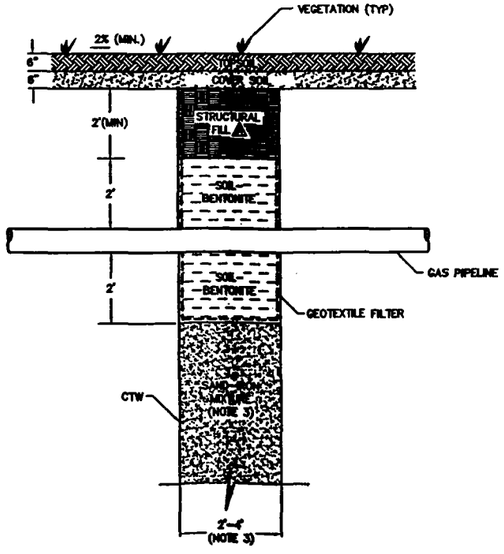
DATE: APRIL 1999	SCALE: AS SHOWN
DESIGNED BY: BMS	JOB NO.: TR0091-04
DRAWN BY:	FILE NO: 00010005
CHECKED BY: MJM	REVISION: D
REVIEWED BY: TK	DRAWING NO: 5 OF 9
APPROVED BY: JFB	



2/4 DETAIL
CHEMICAL TREATMENT WALL (CTW)
SCALE: 1" = 2'



3/4 DETAIL
CTW AT GAS LINE
SCALE: 1" = 2'



A/6 SECTION
CTW AT GAS LINE
SCALE: 1" = 2'

NOTES:

1. DETAILS ARE SHOWN TO SCALE AS NOTED EXCEPT FOR GEOSYNTHETICS, WHICH ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY. MATERIAL TOLERANCES SHALL BE WITHIN THE LIMITS GIVEN IN THE SPECIFICATIONS.
2. CHEMICAL TREATMENT WALL (CTW) SHALL EXTEND FROM THE OVERBURDEN GROUNDWATER TABLE DOWN TO THE TOP OF BEDROCK SURFACE, AND MUST BE VERIFIED IN THE FIELD BY THE ENGINEER.
3. CTW PLAN AND PROFILE AND SAND/IRON MIXTURE RATIOS FOR EACH CTW SEGMENT AND CTW TRENCH THICKNESS ARE PROVIDED ON DRAWING 5. CONTRACTOR SHALL ADJUST SAND/IRON MIXTURE ACCORDINGLY BASED ON SELECTED CTW TRENCH WIDTH AS SHOWN ON DRAWING 5 AND DESCRIBED IN SPECIFICATIONS.
4. TOP OF CTW REFERS TO THE UPPER LIMIT OF THE SAND/IRON MIXTURE AND CORRESPONDS TO THE OVERBURDEN GROUND-WATER TABLE ELEVATION. APPROXIMATE OVERBURDEN GROUNDWATER TABLE ELEVATIONS ARE SHOWN ON DRAWING 2. APPROXIMATE TOP OF BEDROCK ELEVATIONS ALONG CTW ALIGNMENT ARE SHOWN ON DRAWING 5.
5. CONTRACTOR SHALL CONSTRUCT AROUND BOTH THE ACTIVE AND INACTIVE GAS PIPELINES AS SHOWN ON THIS DRAWING. ALTERNATIVELY, THE CONTRACTOR MAY ELECT TO DECOMMISSION (REMOVE) A SEGMENT OF THE ABANDONED GAS PIPELINE AT CONTRACTOR'S SOLE EXPENSE. DECOMMISSIONING OF THE ABANDONED GAS PIPELINE SHALL BE IN ACCORDANCE WITH NORTHERN UTILITIES RECOMMENDATIONS AND WILL REQUIRE THEIR AND THE ENGINEER'S PRE-APPROVAL OF THE CONTRACTOR'S DECOMMISSIONING PLAN. PIPELINE DECOMMISSIONING SHALL COMPLY WITH ALL APPLICABLE PCB MEGA RULE REGULATIONS (40 CFR 750, 761).

GEOSYNTEC CONSULTANTS
130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

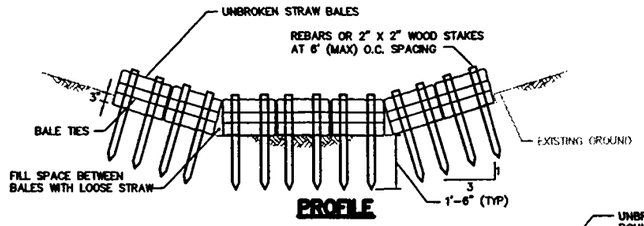
TITLE: CTW DETAILS

MARK	DATE	REVISION	BY	APPROVED
1	JULY 2000	TITLE BLOCK CHANGE	MR	TK
2	DEC 1999		SMG	JFB
3	APRIL 1999	RESPONSE TO MARCH 1999 USEPA COMMENT NUMBERS AND 21	SMG	JFB

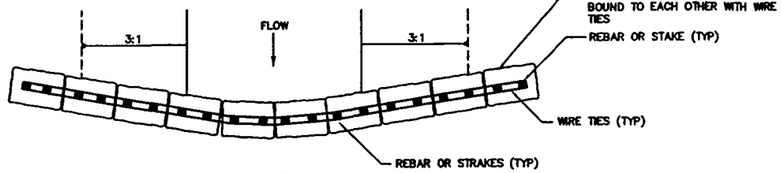
THIS DRAWING MAY NOT BE USED FOR PURPOSES OTHER THAN CONSTRUCTION UNLESS SEALED.

DATE:	APRIL 1999
DESIGN BY:	SMG
DRAWN BY:	AMS/LB
CHECKED BY:	MJM
REVIEWED BY:	TK
APPROVED BY:	JFB
SCALE:	1" = 2'
JOB NO.:	TR0001-01
FILE NO.:	0001A006
REVISION:	D
DRAWING NO.:	6 of 9

100% DESIGN

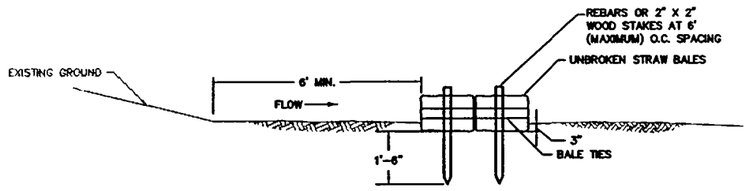


PROFILE

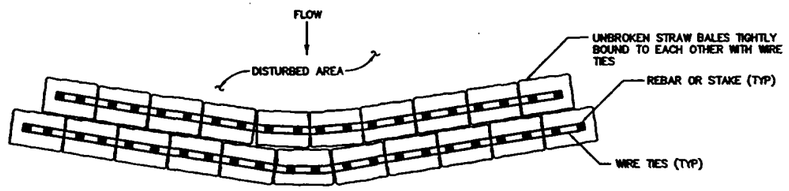


PLAN

4 DETAIL — TEMPORARY STRAW BALE BARRIER— CHANNEL FLOW APPLICATION
SCALE: 1" = 2'

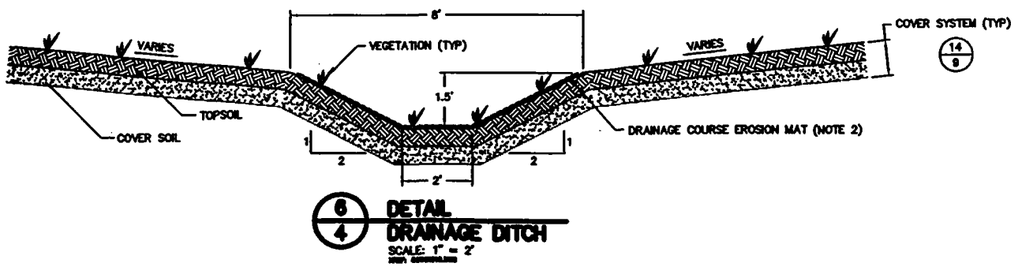


PROFILE

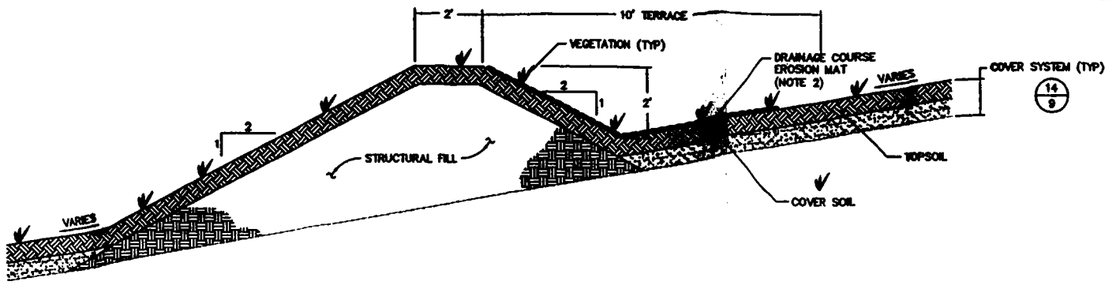


PLAN

5 DETAIL — TEMPORARY STRAW BALE BARRIER— SHEET FLOW APPLICATION
SCALE: 1" = 2'

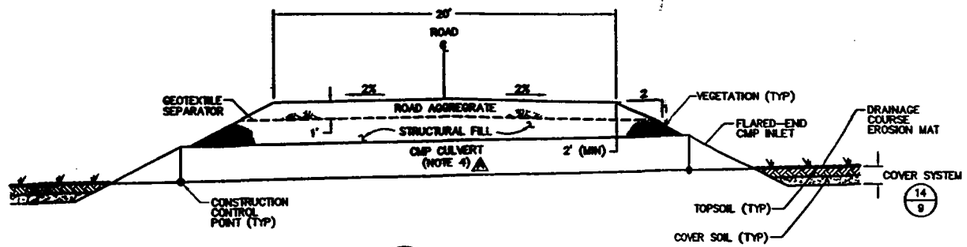


6/4 DETAIL — DRAINAGE DITCH
SCALE: 1" = 2'

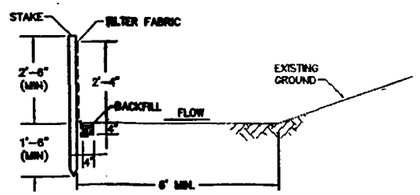


7/4 DETAIL — DRAINAGE TERRACE
SCALE: 1" = 2'

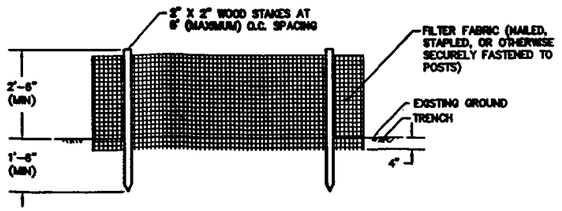
DRAINAGE COURSE EROSION MAT (NOTE 2)



8/4 DETAIL — CULVERT
SCALE: 1" = 4'



PROFILE



ELEVATION

9 DETAIL — SILT FENCE
SCALE: 1" = 2'

100% DESIGN

NOTES:

1. DETAILS ARE SHOWN TO SCALE AS NOTED EXCEPT FOR GEOSYNTHETICS, WHICH ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY. MATERIAL TOLERANCES SHALL BE WITHIN THE LIMITS GIVEN IN THE SPECIFICATIONS.
2. ALL DRAINAGE COURSE EROSION MAT SHALL BE OVERLAPPED, STAKED, AND ANCHORED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR CHANNEL FLOW APPLICATIONS.
3. EXTENT OF STRUCTURAL FILL AROUND AND OVER CMP CULVERT SHALL BE AS-NEEDED TO ACHIEVE A MINIMUM 2-FT COVER ABOVE THE TOP OF CULVERT PIPE, AND TO MAINTAIN A SMOOTH ACCESS ROAD PROFILE.

⚠ 4. CULVERT SIZES ARE SHOWN ON DRAWING 4.

GEOSYNTEC CONSULTANTS
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GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

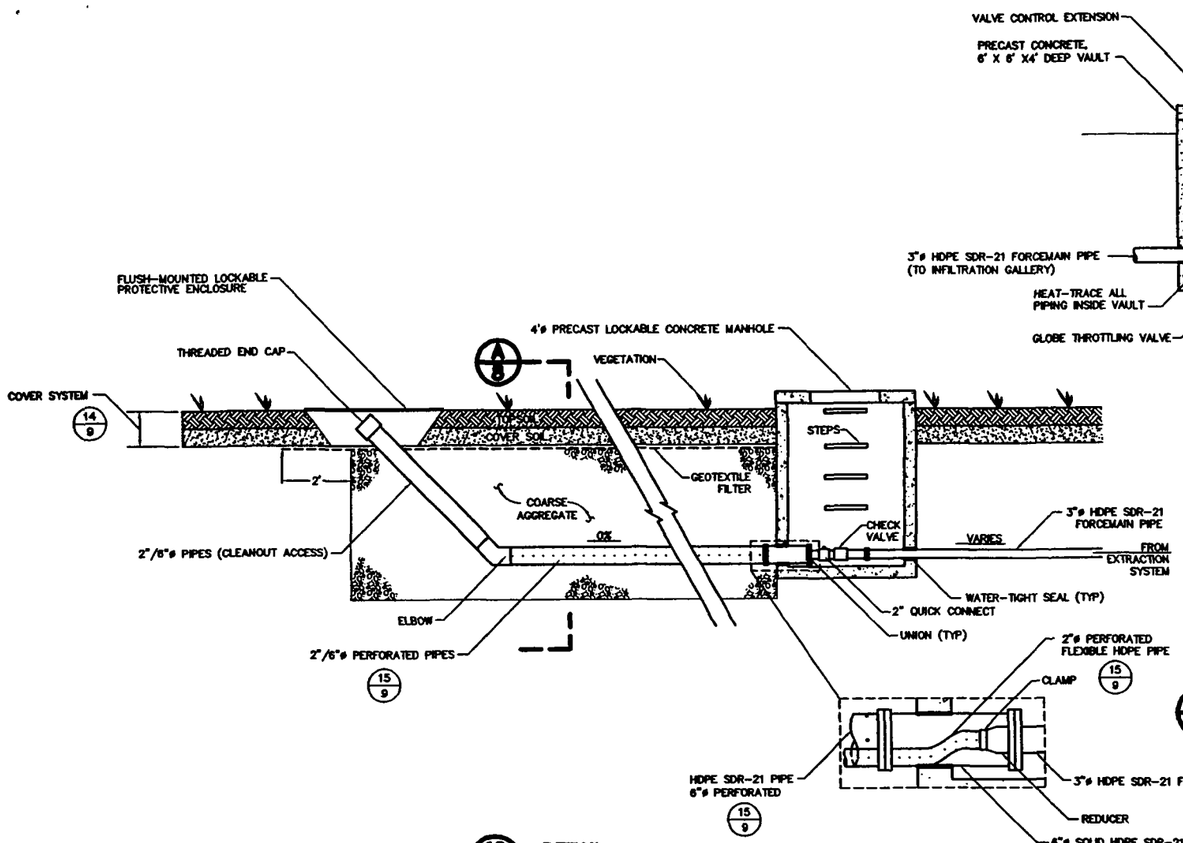
WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: SURFACE WATER MANAGEMENT DETAILS

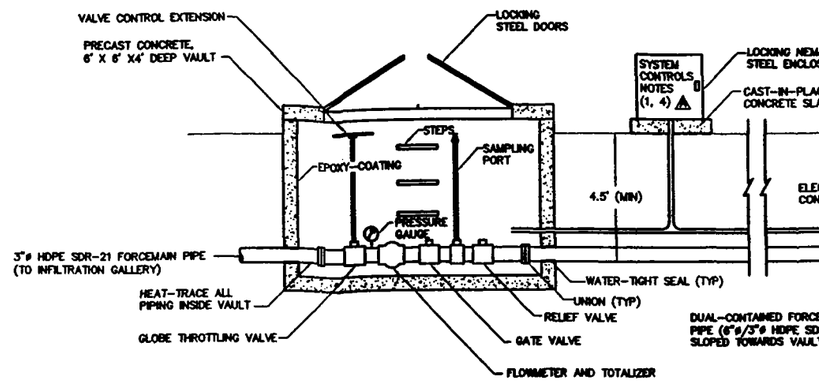
MARK	DATE	REVISION	BY	APPROVED
1	JULY 2004	TITLE BLOCK CHANGE	NR	TK
2	DEC 1999		SMG	JPB
3	APRIL 2000	RESPONSE TO MARCH 1999 MDEPA COMMENT NO. 23	SMG	JPB

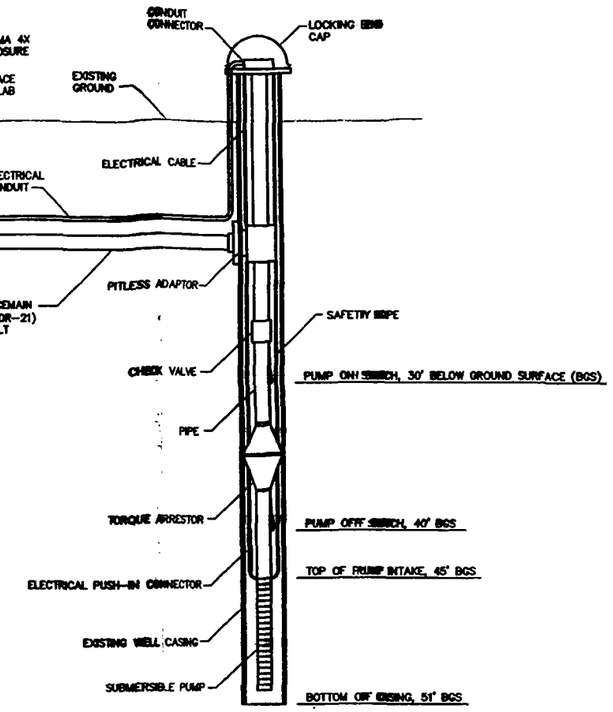
DATED: APRIL 1999	SCALE: AS SHOWN
DESIGN BY: SMG	JOB NO.: TR0001-01
DRAWN BY: JW/LB/AWS	FILE NO: 0001A007
CHECKED BY: MJM	REVISION: D
REVIEWED BY: TK	DRAWING NO: 7 - 9
APPROVED BY:	

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SIGNED.

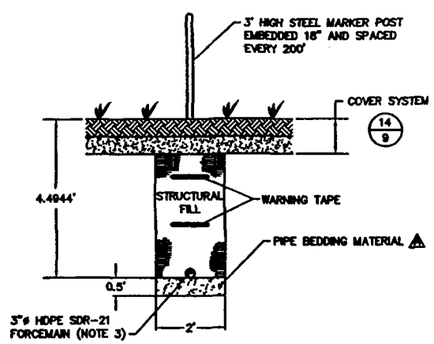


10/4 DETAIL
PROFILE OF INFILTRATION GALLERY
SCALE: 1" = 2' (NOTE 5) ⚠

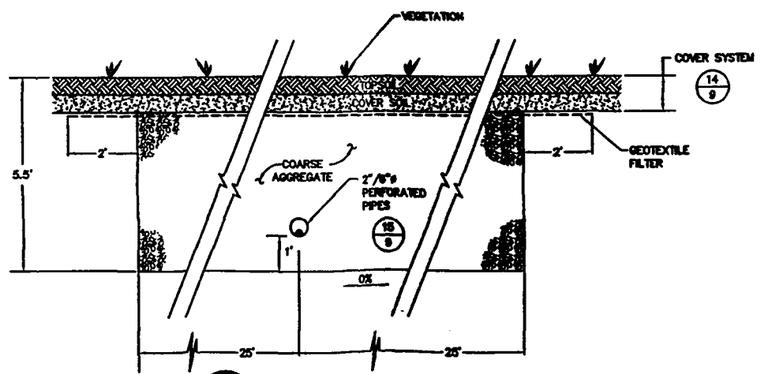




11/4 DETAIL
EXTRACTION/RE-INJECTION SYSTEM CONTROLS
SCALE: N.T.S.



12/— DETAIL
TYPICAL FORCEMAIN EMBEDMENT TRENCH
(NOTE 2)
SCALE: 1" = 2'



A/8 SECTION
INFILTRATION GALLERY
SCALE: 1" = 2' (NOTE 5) ⚠

NOTES:

1. MECHANICAL AND ELECTRICAL COMPONENTS OF THE EXTRACTION/RE-INJECTION SYSTEM (E.G., PIPES, VALVES, FITTINGS, CONTROLS, POWER, ETC.) SHALL BE INSTALLED AS DESCRIBED FURTHER IN THE SPECIFICATIONS AND IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS. ELECTRICAL INSTALLATION SHALL CONFORM TO NATIONAL ELECTRICAL CODE, AND APPLICABLE PROVINCIAL/LOCAL CODES.
2. FORCEMAIN EMBEDMENT TRENCH OUTSIDE THE EXTRACTION SYSTEM LIMITS SHALL CONFORM TO THE DIMENSIONS SHOWN AND SHALL BE BACKFILLED WITH STRUCTURAL FILL, FOLLOWED BY RESTORATION OF THE EXISTING GROUND SURFACE MATERIALS AND CONDITIONS.
3. 3-INCH FORCEMAIN SHALL BE SHALL-CONTAINED WITHIN EXTRACTION WELL AND VAULT, USING A 6-INCH DIAMETER HDPE OUTER CONTAINMENT PIPE.
⚠ 4. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF SYSTEM CONTROLS TO ENGINEER NO LATER THAN 30 DAYS PRIOR TO SYSTEM INSTALLATION. CONTROLS SHALL INCLUDE AN AUTOMATIC AND MANUAL OVERRIDE ON/OFF SWITCH FOR THE PUMP AND A PROGRAMMABLE LOGIC CONTROLLER WHICH RESPONDS TO THE GROUNDWATER LEVEL SWITCHES IN THE WELL, AND ADDITIONAL COMPONENTS AS NEEDED AND AS RECOMMENDED BY THE MANUFACTURER TO ENSURE THE SYSTEM FUNCTIONS AS-SPECIFIED.
⚠ 5. INFILTRATION GALLERY SHALL HAVE A PLAN AREA OF 125' X 50' AS SHOWN ON DRAWING 4.

100% DESIGN

GeoSyntec Consultants
130 Research Lane, Suite 2
Guelph, Ontario, Canada N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

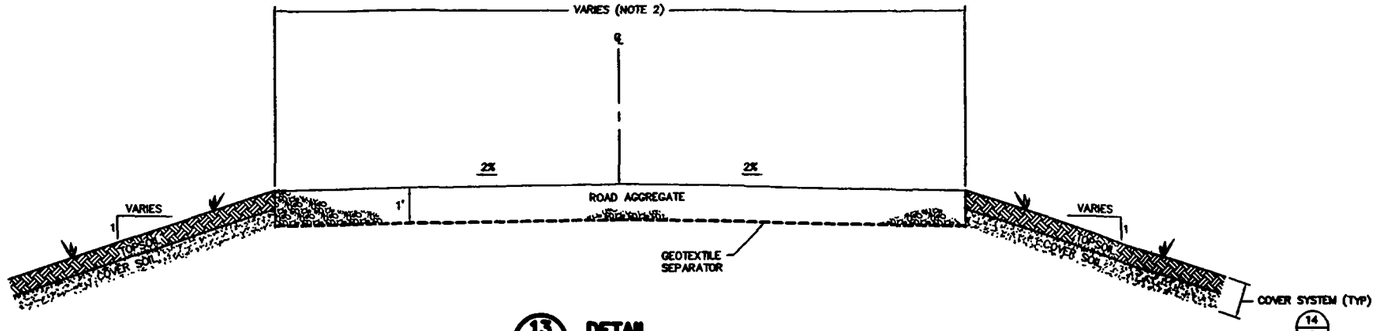
PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

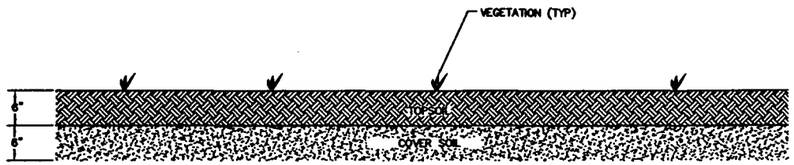
TITLE: GROUNDWATER EXTRACTION/RE-INJECTION SYSTEM DETAILS

MARK	DATE	REVISION	BY	APPROVED
⚠	JULY 2004	TITLE BLOCK CHANGE	MR	TK
⚠	DEC 1999		SMD	JFB
⚠	APRIL 1999	RESPONSE TO MARCH 1999 USEPA COMMENTS #4, 25, AND 26	SMD	JFB

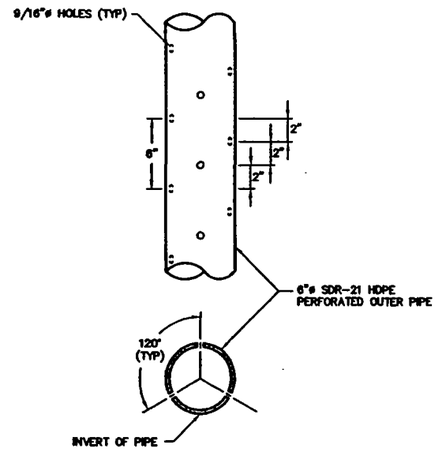
DATE:	APRIL 1999
DESIGNED:	SMD
DRAWN:	AWS/LB
CHECKED:	MJM
REVIEWED:	TK
APPROVED:	JFB
SCALE:	AS SHOWN
JOB NO.:	TR0001-01
FILE NO:	0001A008
REVISION:	D
DRAWING NO:	8 of 9

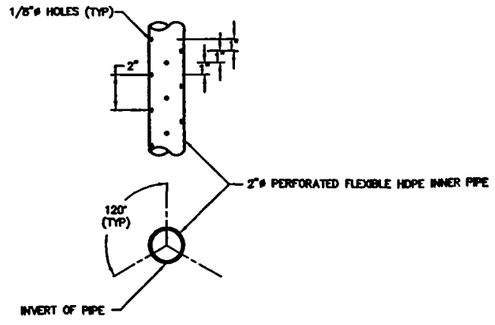


13/4 DETAIL
COVER AND PARK ACCESS ROAD
SCALE: 1" = 2'

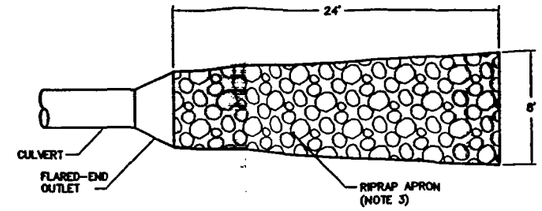


14/6 DETAIL
COVER SYSTEM
SCALE: 1" = 1'

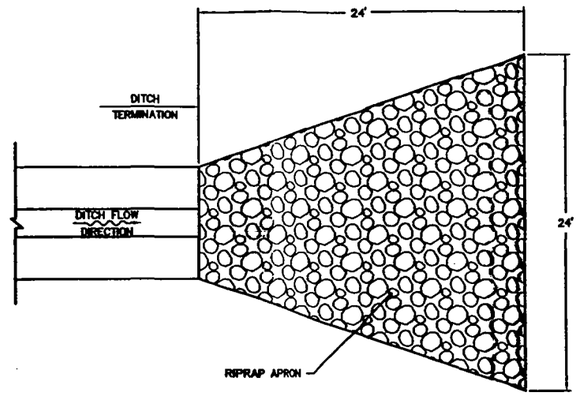




15/8 DETAIL
PIPE PERFORATIONS
SCALE: N.T.S.



16/4 DETAIL
CULVERT OUTLET APRON ⚠
SCALE: NOT TO SCALE



17/4 DETAIL
DITCH OUTLET APRON ⚠
SCALE: 1" = 5'

NOTES:

1. DETAILS ARE SHOWN TO SCALE AS NOTED EXCEPT FOR GEOSYNTHETICS, WHICH ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY. MATERIAL TOLERANCES SHALL BE WITHIN THE LIMITS GIVEN IN THE SPECIFICATIONS.
2. ACCESS ROAD LEADING FROM ENTRANCE ON BLACKWATER ROAD TO THE INFILTRATION GALLERY SHALL BE 20-FT WIDE AS SHOWN ON DRAWING 4. ACCESS ROADS AND PARKING AREAS ON-SITE THAT ARE TO HAVE THEIR PAVEMENT REMOVED SHALL BE RE-BUILT TO THEIR ORIGINAL WIDTHS.

⚠3. RIPRAP SHALL HAVE D'5'0 = 6 IN. AND D'M'A'X = 12 IN. RIPRAP APRONS SHALL BE 12 IN. THICK AND SHALL BE UNDERLAIN BY GEOTEXTILE FILTER.

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GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: GENERAL DETAILS

MARK	DATE	REVISION	BY	APPROVED
⚠	JULY 2004	TITLE BLOCK CHANGE	MR	TK
⚠	DEC 1999		SMS	JFB
⚠	APRIL 1999	RESPONSE TO MARCH 1999 USEPA COMMENTS	SMS	JFB

DATE:	APRIL 1999
SCALE:	AS SHOWN
DESIGN BY:	SMC
JOB NO.:	TR0001-01
DRAWN BY:	SMS
FILE NO:	0001A009
CHECKED BY:	SMM
REVISION:	D
REVIEWED BY:	TR
DRAWING NO:	9 OF 9
APPROVED BY:	JFB

100% DESIGN

APPENDIX B

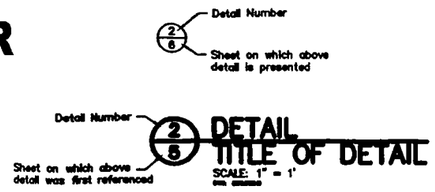
AS BUILT DRAWINGS FOR PERMEABLE LANDFILL COVER AND BEDROCK GROUNDWATER EXTRACTION SYSTEM

SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

SOMERSWORTH, NEW HAMPSHIRE
PREFERRED REMEDIAL ACTION
PERMEABLE LANDFILL COVER AND BEDROCK GROUNDWATER EXTRACTION COMPONENTS
AS-BUILT DRAWINGS

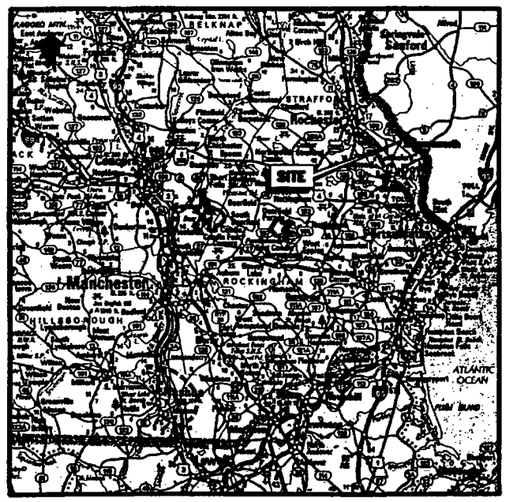
JULY 2004

DETAIL IDENTIFICATION LEGEND



Example: Detail Number 2 presented on Sheet No. 6 was referenced for the first time from Sheet No. 5.

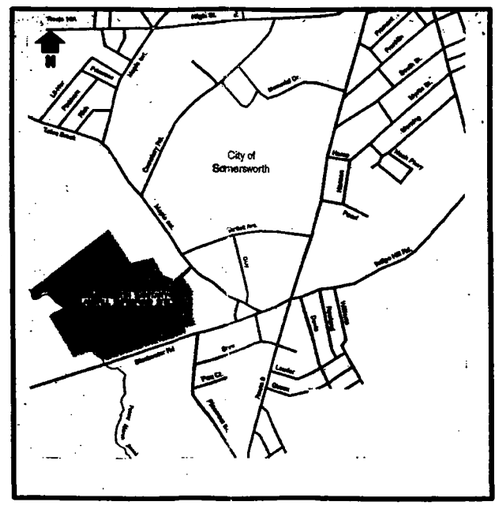
Note: Above system also applies to section identifications.



LOCATION MAP
0 10 MILES
SCALE

LIST OF DRAWINGS

DRAWING	DESCRIPTION
1	TITLE SHEET
2	PRE-CONSTRUCTION SITE CONDITIONS
3	SITE PLAN
4	PERMEABLE SOIL COVER AS-BUILT
5	SURFACE-WATER MANAGEMENT DETAILS
6	GROUNDWATER EXTRACTION/RE-INJECTION SYSTEM DETAILS
7	GENERAL DETAILS



VICINITY MAP
0 1000 FT.
SCALE

PREPARED FOR:

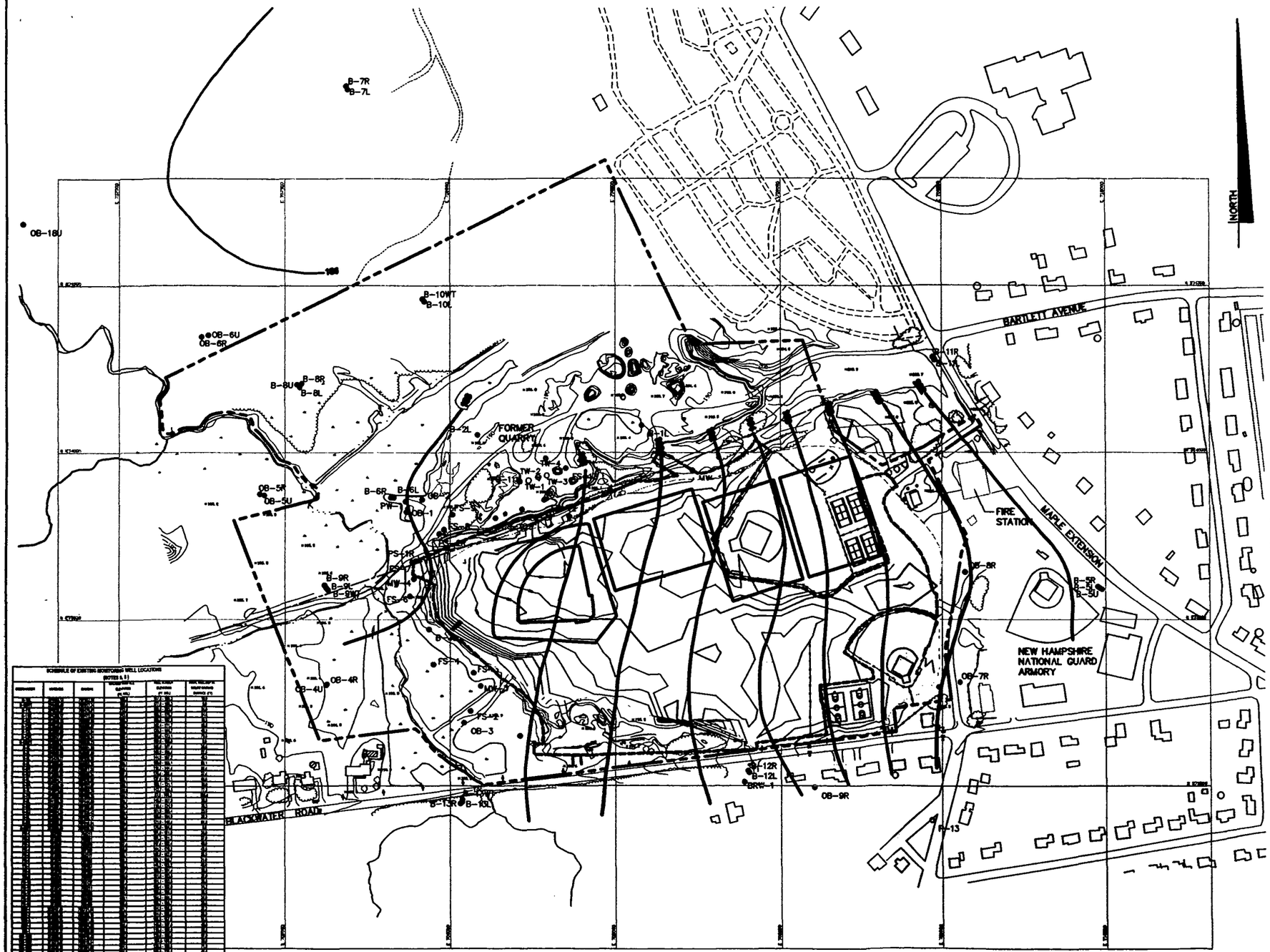
THE SOMERSWORTH LANDFILL SITE GROUP

PREPARED BY:

GEOSYNTEC CONSULTANTS

130 RESEARCH LANE, SUITE 2
GUELPH, ONTARIO, CANADA N1G 5G3
(519) 822-2230

PROJECT NUMBER TR0057-42
FILE NUMBER 0057-001
DRAWING NUMBER 1 OF 7
REVISION D



LEGEND

- 200 — OVERBURDEN PIEZOMETRIC SURFACE (FEET)
- 210 — EXISTING GROUND ELEVATION (FEET)
- ·213.1 — EXISTING SPOT ELEVATION (FEET)
- APPROXIMATE PROPERTY BOUNDARY (NOTE 3)
- PAVED ROAD
- UNPAVED ROAD
- WATER LINE
- TREELINE
- APPROXIMATE EXTENT OF WASTE (NOTE 3)
- FENCE
- NATURAL GAS PIPELINE (NOTES 3,4)
- UTILITY POLE
- MONITORING WELL (NOTE 5)
- WETLANDS

NOTES:

1. TOPOGRAPHIC MAP AND RELATED SITE FEATURES COMPILED BY EASTERN TOPOGRAPHICS, INC. WOLFBORO, NEW HAMPSHIRE, BASED ON AERIAL PHOTOGRAPHY TAKEN IN FALL 1996. EXISTING TOPOGRAPHY SHOWN WITHIN THE APPROXIMATE EXTENT OF WASTE LINE WAS SURVEYED BY TRITECH ENGINEERING CORPORATION IN NOVEMBER 2000.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (AMSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
3. LOCATIONS OF PROPERTY BOUNDARY, NATURAL GAS PIPELINE, AND EXTENT OF WASTE BOUNDARY ARE APPROXIMATE, AND WERE TAKEN FROM FIGURE 1.2 OF THE SEPTEMBER 1998 CONCEPTUAL DESIGN REPORT, PREPARED BY BEAK INTERNATIONAL, INC., GUELPH, ONTARIO.
4. GAS PIPELINE OWNER, NORTHERN UTILITIES, INC., HAS INDICATED THAT AN ACTIVE GAS PIPELINE AND ABANDONED GAS PIPELINE EXIST SIDE-BY-SIDE ALONG THE APPROXIMATE LOCATION SHOWN ON THIS DRAWING. CONTRACTOR IS RESPONSIBLE FOR CONTACTING NORTHERN UTILITIES AT (603)436-0310 TO LOCATE THESE GAS PIPELINES.
5. GROUNDWATER MONITORING WELL LOCATIONS, TABULATED TO THE NEAREST 0.01-FT LOCATION AND SHOWN ON THIS DRAWING, WERE TAKEN FROM JULY 1998 DESIGN INVESTIGATION REPORT FOR THE PILOT STUDY AND SITE GROUNDWATER MONITORING PROGRAM, REMEDIAL DESIGN FOR PREFERRED REMEDIAL ACTION AT THE SOMERSWORTH SANITORY LANDFILL SUPERFUND SITE, PREPARED BY BEAK INTERNATIONAL, INC.
6. OVERBURDEN PIEZOMETRIC SURFACE (I.E., WATER TABLE) IS APPROXIMATE AND SHOWS CONTOURS FROM 28 APRIL 1998. SURFACE WAS TAKEN FROM FIGURE 5.4 OF THE JUNE 1998 DESIGN INVESTIGATION REPORT FOR THE PRE-PILOT HYDROGEOLOGICAL AND GEOTECHNICAL INVESTIGATION, PREPARED BY BEAK INTERNATIONAL, INC. ADDITIONAL INFORMATION ON THE SITE HYDROGEOLOGY (E.G., WATER TABLE ELEVATIONS, TOP OF BEDROCK ELEVATIONS, ETC.) IS INCLUDED WITH THE CONTRACT DOCUMENTS. CONTRACTOR MAY PERFORM SITE INVESTIGATION AT THEIR OWN EXPENSE TO FURTHER DEFINE THE HYDROGEOLOGIC CONDITIONS THAT MAY BE ENCOUNTERED.
7. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF EXISTING CONDITIONS SHOWN ON THIS DRAWING.
8. WELLS OB-19U AND OB-20U ARE LOCATED BEYOND THE MAPPING LIMITS SHOWN ON THIS DRAWING.

150 75 0 150 300
SCALE IN FEET

SCHEDULE OF EXISTING MONITORING WELL LOCATIONS (NOTES 5, 6)

MONUMENT	OVERBURDEN	BEDROCK	WELL HEAD ELEVATION (FT MSL)	WELL SCREEN ELEVATION (FT MSL)	WELL HEAD ELEVATION (FT MSL)	WELL SCREEN ELEVATION (FT MSL)

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THE SOMERSWORTH LANDFILL SITE GROUP

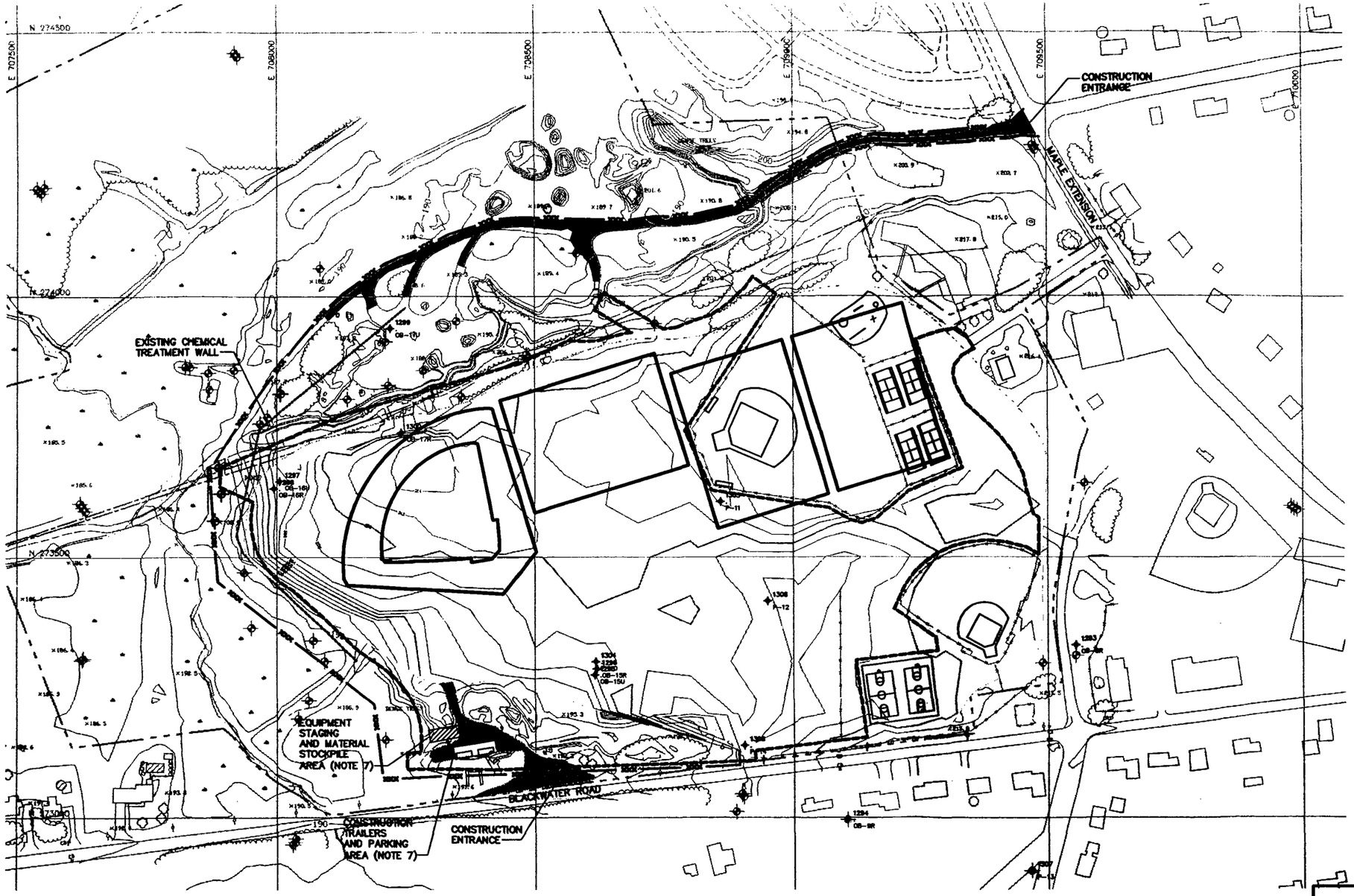
PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: PRE-CONSTRUCTION SITE CONDITIONS

MARK	DATE	REVISION	BY	APPROVED
3	JULY 2001	TITLE BLOCK CHANGE	MR	TK
2	DECEMBER 2000	UPDATED EXISTING TOPOGRAPHY	MLB	MJM
1	APRIL 2000	CHANGE LOCATION OF FS-11	MBB	TK
0	APRIL 1999	NO CHANGES TO THIS DRAWING	SMG	JPB

DATE: DECEMBER 2000 | SCALE: 1" = 150'
DESIGN BY: SMG/MLB | JOB NO.: TR0057-42
DRAWN BY: JW | FILE NO.: 0057-002
CHECKED BY: MJM/KB | REVISION: D
REVIEWED BY: TK | DRAWING NO.: 2 OF 7
APPROVED BY: MJM



LEGEND

- 210 — EXISTING GROUND ELEVATION (FEET)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING WATER LINE
- APPROXIMATE EXTENT OF EXISTING WASTE
- EXISTING FENCE
- EXISTING NATURAL GAS PIPELINE
- EXISTING UTILITY POLE
- EXISTING MONITORING WELL
- EXISTING WETLANDS (NOTE 6)
- PROPOSED CONSTRUCTION ACCESS ROAD (NOTE 8)
- PROPOSED SILT FENCE (NOTE 9)

100 50 0 100 200
SCALE IN FEET

NOTES:

1. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (AMSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
2. EXISTING CONDITIONS TAKEN FROM DRAWING 2.
3. CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING SURVEY CONTROL AT THE SITE PRIOR TO CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF EXISTING SITE CONDITIONS, AND SHALL PERFORM PRE-CONSTRUCTION SURVEY AS FURTHER DESCRIBED IN THE SPECIFICATIONS. CONTRACTOR SHALL LOCATE AND PROVIDE CLEARANCE FOR ALL ABOVE-GROUND AND UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. THE GAS PIPELINE OWNER, NORTHERN UTILITIES, INC., MAY BE REACHED AT (603) 436-0310.
5. ANY EXISTING FACILITY OR SITE FEATURE, (E.G., NATURAL GAS PIPELINE, GROUNDWATER WELLS, FENCING, ETC.) DAMAGED BY THE CONTRACTOR SHALL BE RESTORED OR REPLACED TO THE SATISFACTION OF THE SITE GROUP. THE CONTRACTOR SHALL BEAR THE ENTIRE COST OF RESTORATION AND/OR REPLACEMENT. CONSTRUCTION ACTIVITIES ADJACENT TO THESE FEATURES SHALL BE AS DESCRIBED IN THE SPECIFICATIONS.
6. THE CONTRACTOR SHALL BE AWARE OF THE MARKED WETLAND LIMITS AS DESIGNATED WITH WARNING TAPE. THE CONTRACTOR IS NOT PERMITTED TO WORK WITHIN THE WETLANDS LIMITS AT ANYTIME.
7. CONTRACTOR'S FACILITIES, MATERIAL STOCKPILES, STAGING AREAS, AND STORAGE AREAS SHALL BE LOCATED AS SHOWN ON THIS DRAWING AND DESCRIBED IN THE CONTRACT DOCUMENTS, UNLESS PRIOR APPROVAL IS OBTAINED BY THE SITE GROUP. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL SUCH AREAS DURING CONSTRUCTION AND FOR CLEANUP/RESTORATION OF SUCH AREAS AFTER CONSTRUCTION.
8. CONTRUCTION TRAFFIC ACCESS TO THE SITE SHALL BE RESTRICTED TO THE SITE ENTRANCE ON BLACKWATER ROAD AS SHOWN ON THIS DRAWING, UNLESS OTHERWISE APPROVED BY THE SITE GROUP. CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION/MAINTENANCE OF THE CONSTRUCTION ACCESS ROAD AND ANY OTHER TEMPORARY ACCESS ROADS NECESSARY FOR CONSTRUCTION. LOCATIONS OF TEMPORARY ACCESS ROADS SHALL BE ONLY AS APPROVED BY THE SITE GROUP.
9. STORM-WATER MANAGEMENT AND EROSION AND SEDIMENT (E&S) CONTROL FEATURES SHALL BE ESTABLISHED BY THE CONTRACTOR IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REQUIREMENTS AND THE SPECIFICATIONS. THE FEATURES SHALL BE INSTALLED BY THE CONTRACTOR AROUND AND DOWN-GRADIENT OF AREAS TO BE DISTURBED PRIOR TO CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR AS NEEDED DURING AND AFTER CONSTRUCTION IN ACCORDANCE WITH THE SPECIFICATIONS.

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THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: SITE PLAN

MARK	DATE	REVISION	BY	APPROVED
1	[illegible]	TITLE BLOCK CHANGE	MR	TK
2	[illegible]	UPDATED EXISTING TOPOGRAPHY	MLB	MJM
3	[illegible]	GW EXTENDED 75 FT. N.E.	MLB	TK
4	[illegible]	NO CHANGES TO THIS DRAWING	SMB	JFB

DATE: DECEMBER 2000
DESIGNED: SMB/MLB
DRAWN: JF
CHECKED: MJM/CB
REVIEWED: TK
APPROVED: MJM

SCALE: 1" = 100'
JOB NO.: TR0057-42
FILE NO.: 0001-003
REVISION: D
DRAWING NO.: 3 OF 7

NORTH

LEGEND

- AS-BUILT FINISHED GRADE (FEET AMSL)
- EXISTING GROUND ELEVATION (FEET AMSL)
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING WATER LINE
- APPROXIMATE EXTENT OF EXISTING WASTE
- EXISTING FENCING
- EXISTING NATURAL GAS PIPELINE
- EXISTING UTILITY POLE
- EXISTING MONITORING WELL (EXACT LOCATION)
- EXISTING MONITORING WELL (ESTIMATED LOCATION)
- EXISTING WETLANDS
- LIMIT OF DISTURBANCE
- EXTRACTION/RE-INJECTION FORCEMAIN
- COVER/PARK ACCESS ROAD
- EXISTING CHEMICAL TREATMENT WALL (CTW)

100 50 0 100 200
SCALE IN FEET

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THE SOMERSWORTH LANDFILL SITE GROUP

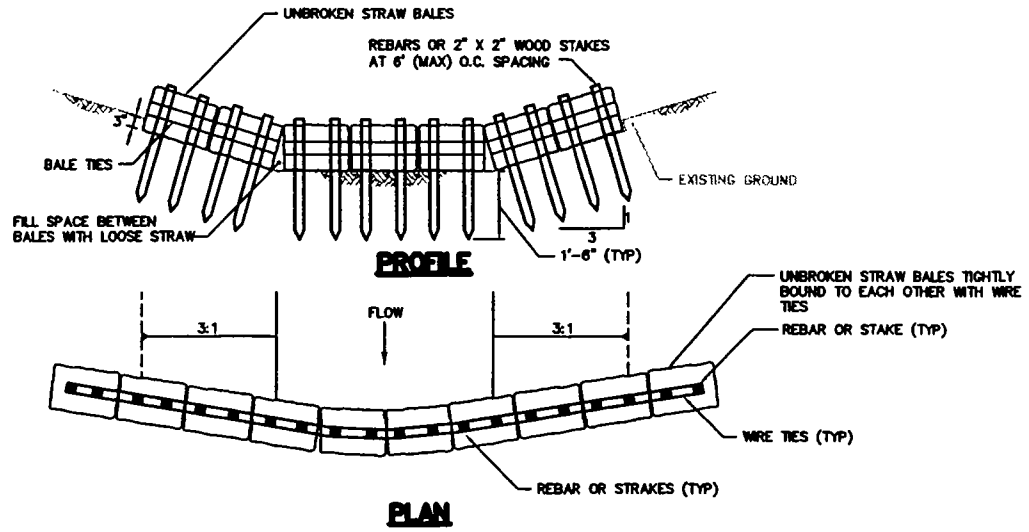
AS-BUILT DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

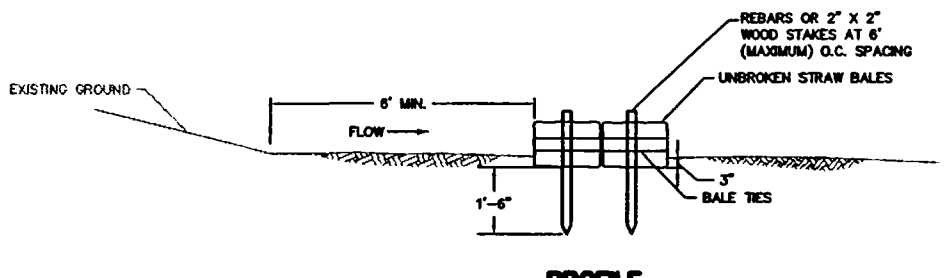
PERMEABLE SOIL COVER AS-BUILT

MARK	DATE	REVISION	BY	APPROVED
1	2004	AS-BUILT	MR	TK

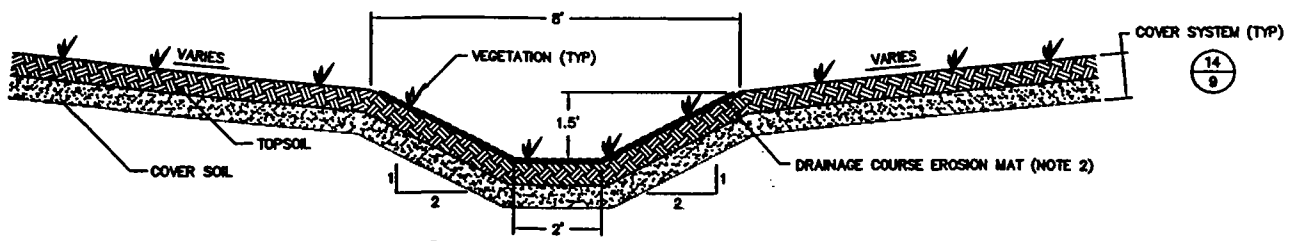
DATE: JANUARY 2005	SCALE: 1" = 100'
DESIGNED BY: ———	JOB NO.: TR0057-01
DRAWN BY: JMD	FILE NO.: 0057-001
CHECKED BY: MLB	REVISION: D
TECHNICAL BY: MJM	DRAWING NO.: 4 OF 7
APPROVED BY: MJM	



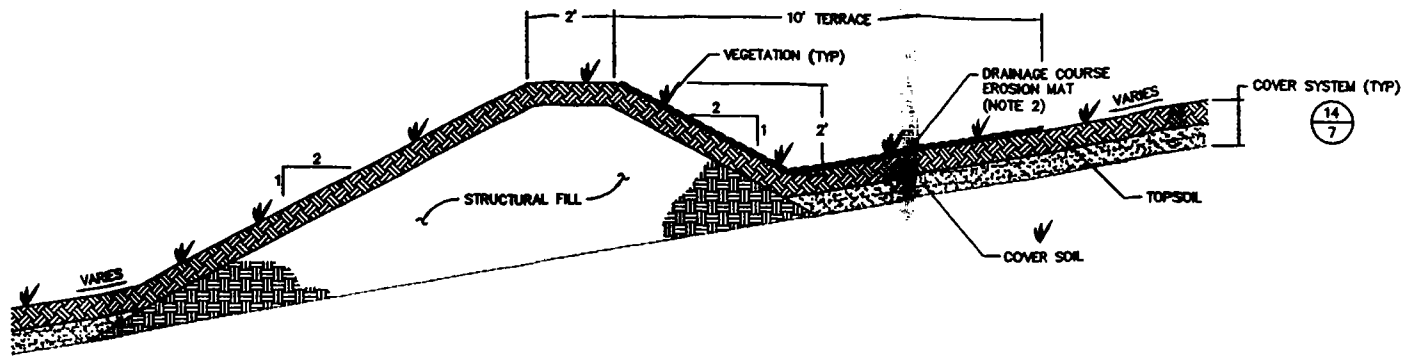
4/- DETAIL
TEMPORARY STRAW BALE BARRIER—CHANNEL FLOW APPLICATION
SCALE: 1" = 2'



5/- DETAIL
TEMPORARY STRAW BALE BARRIER—SHEET FLOW APPLICATION
SCALE: 1" = 2'

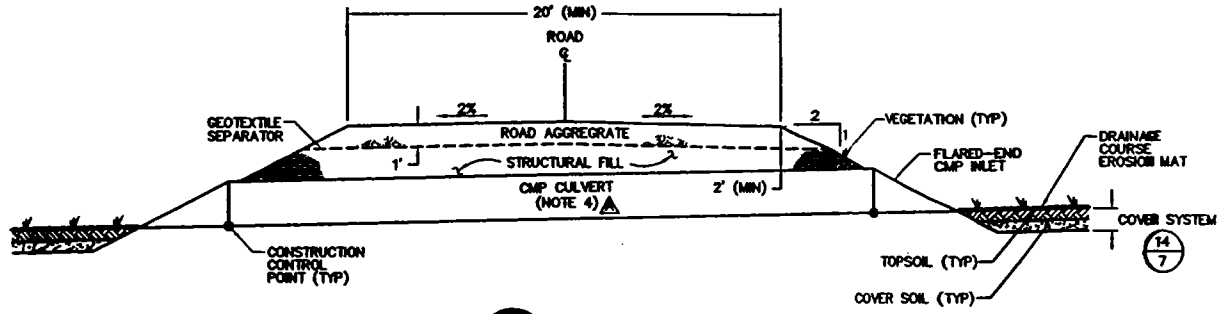


6/4 DETAIL
DRAINAGE DITCH
SCALE: 1" = 2'

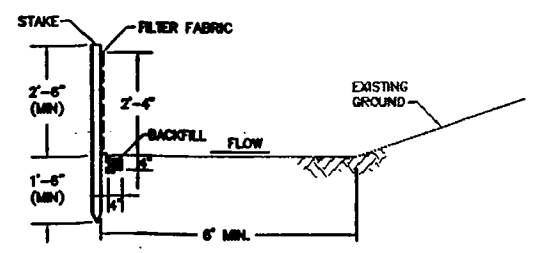


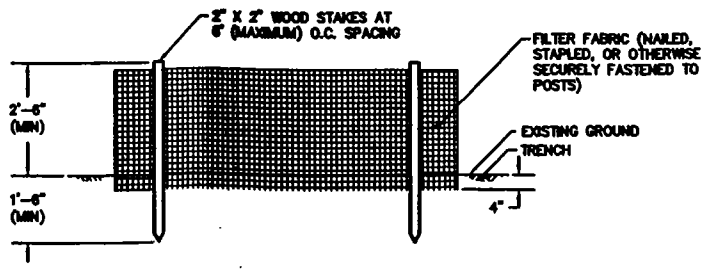
7/4 DETAIL
DRAINAGE TERRACE
SCALE: 1" = 2'

DRAINAGE COURSE EROSION MAT (NOTE 2)



8/4 DETAIL
CULVERT
SCALE: 1" = 4'





9/- DETAIL
SILT FENCE
SCALE: 1" = 2'

NOTES:

1. DETAILS ARE SHOWN TO SCALE AS NOTED EXCEPT FOR EROSION MAT AND SILT FENCE, WHICH ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY. MATERIAL TOLERANCES SHALL BE WITHIN THE LIMITS GIVEN IN THE SPECIFICATIONS.
2. ALL DRAINAGE COURSE EROSION MAT SHALL BE OVERLAPPED, STAKED, AND ANCHORED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR CHANNEL FLOW APPLICATIONS.
3. EXTENT OF STRUCTURAL FILL AROUND AND OVER CMP CULVERT SHALL BE AS-NEEDED TO ACHIEVE A MINIMUM 2-FT COVER ABOVE THE TOP OF CULVERT PIPE, AND TO MAINTAIN A SMOOTH ACCESS ROAD PROFILE.

⚠ 4. CULVERT SIZES ARE SHOWN ON DRAWING 4.

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THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: SURFACE WATER MANAGEMENT DETAILS

MARK	DATE	REVISION	BY	APPROVED
3	JULY 2004	TITLE BLOCK CHANGE	MR	TK
2	DECEMBER 2000	UPDATE FIGURE NUMBERS	NLB	MJM
1	APRIL 1999	RESPONSE TO MARCH 1999 USEPA COMMENT NO.23	SMG	JPB

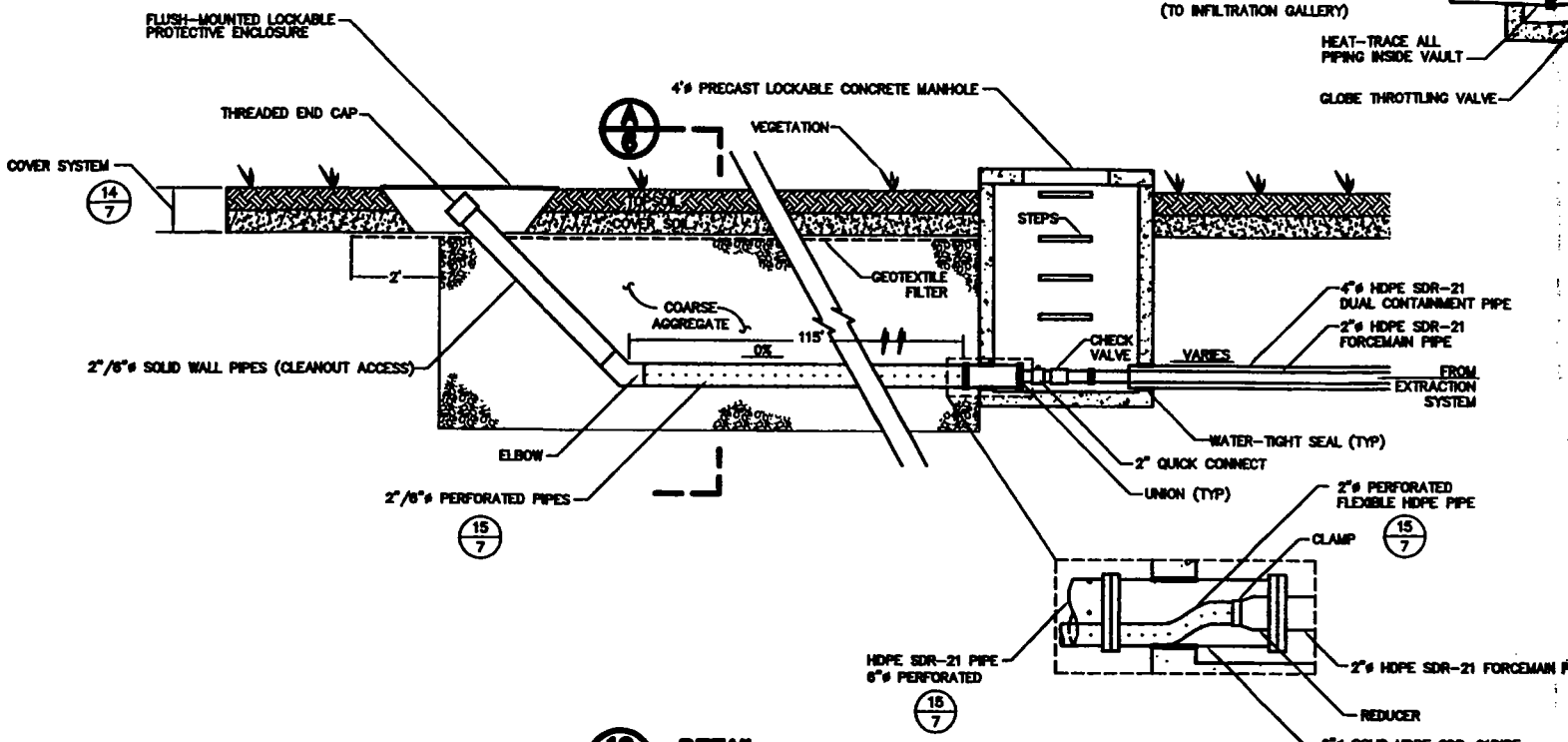
THIS DRAWING MAY NOT BE USED FOR PROJECT BIDDING OR CONSTRUCTION, UNLESS SIGNED.

SIGNATURE

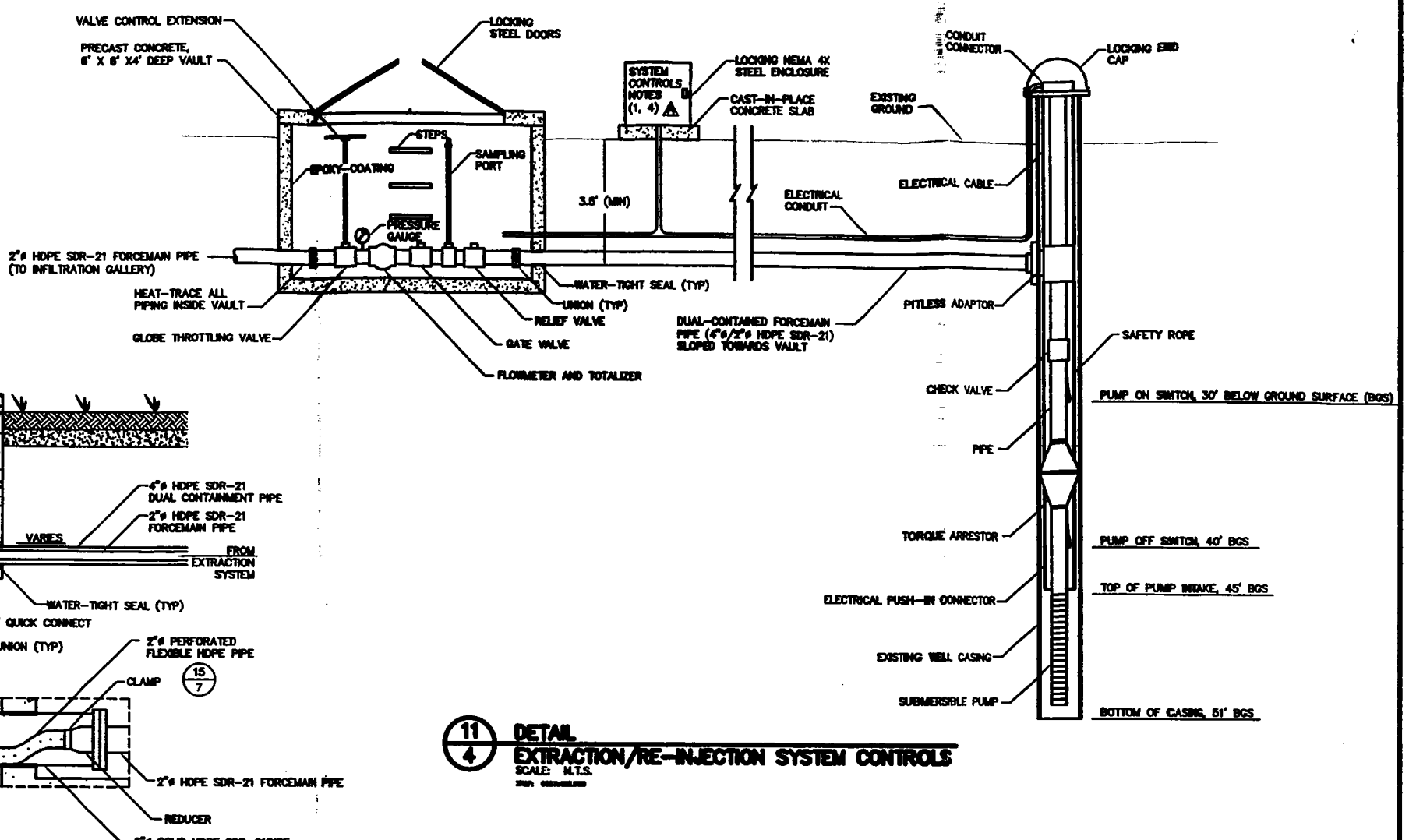
DATE

SEAL

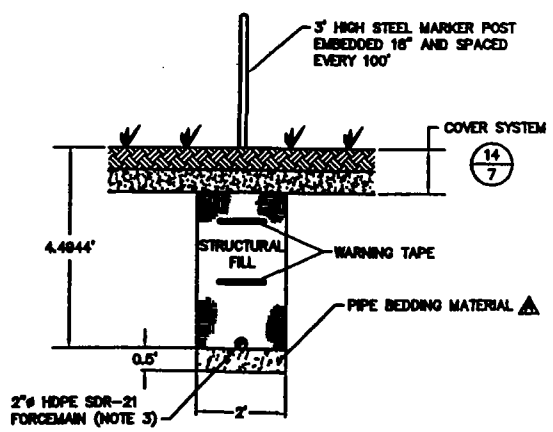
DATE: DECEMBER 2000	SCALE: AS SHOWN
DESIGN BY: SMG/NLB	JOB NO.: TR0057-42
DRAWN BY: JW/LB/AWS	FILE NO: 0057-005
CHECKED BY: MJM/CB	REVISION: D
REVIEWED BY: TK	DRAWING NO: 5 OF 7
APPROVED BY: MJM	



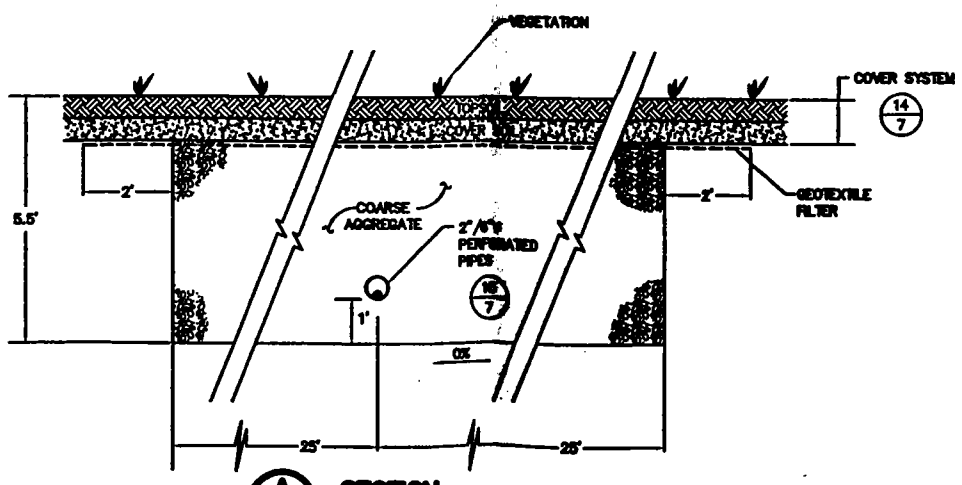
10/4 DETAIL
INFILTRATION GALLERY
SCALE: 1" = 2' (NOTE 5)



11/4 DETAIL
EXTRACTION/RE-INJECTION SYSTEM CONTROLS
SCALE: N.T.S.



12/- DETAIL
TYPICAL FORCEMAIN EMBEDMENT TRENCH
(NOTE 2)
SCALE: 1" = 2'



A/6 SECTION
INFILTRATION GALLERY
SCALE: 1" = 2' (NOTE 5)

NOTES:

1. MECHANICAL AND ELECTRICAL COMPONENTS OF THE EXTRACTION/RE-INJECTION SYSTEM (E.G., PIPES, VALVES, FITTINGS, CONTROLS, POWER, ETC.) SHALL BE INSTALLED AS DESCRIBED FURTHER IN THE SPECIFICATIONS AND IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS. ELECTRICAL INSTALLATION SHALL CONFORM TO NATIONAL ELECTRICAL CODE, AND APPLICABLE STATE/LOCAL CODES.
2. FORCEMAIN EMBEDMENT TRENCH OUTSIDE THE COVER SYSTEM LIMITS SHALL CONFORM TO THE DIMENSIONS SHOWN AND SHALL BE BACKFILLED WITH STRUCTURAL FILL, FOLLOWED BY RESTORATION OF THE EXISTING GROUND SURFACE MATERIALS AND CONDITIONS.
3. 2-INCH FORCEMAIN SHALL BE DUAL-CONTAINED BETWEEN EXTRACTION WELL AND VAULT, USING A 4-INCH DIAMETER SDR-21 HDPE DUAL CONTAINMENT PIPE.
⚠ 4. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF SYSTEM CONTROLS TO ENGINEER NO LATER THAN 30 DAYS PRIOR TO SYSTEM INSTALLATION. CONTROLS SHALL INCLUDE AN AUTOMATIC AND MANUAL OVERRIDE ON/OFF SWITCH FOR THE PUMP AND A PROGRAMMABLE LOGIC CONTROLLER WHICH RESPONDS TO THE GROUNDWATER LEVEL SWITCHES IN THE WELL, AND ADDITIONAL COMPONENTS AS NEEDED AND AS RECOMMENDED BY THE MANUFACTURER TO ENSURE THE SYSTEM FUNCTIONS AS-SPECIFIED.
⚠ 5. INFILTRATION GALLERY SHALL HAVE A PLAN AREA OF 125' X 50' AS SHOWN ON DRAWING 4.

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THE SOMERSWORTH LANDFILL SITE GROUP

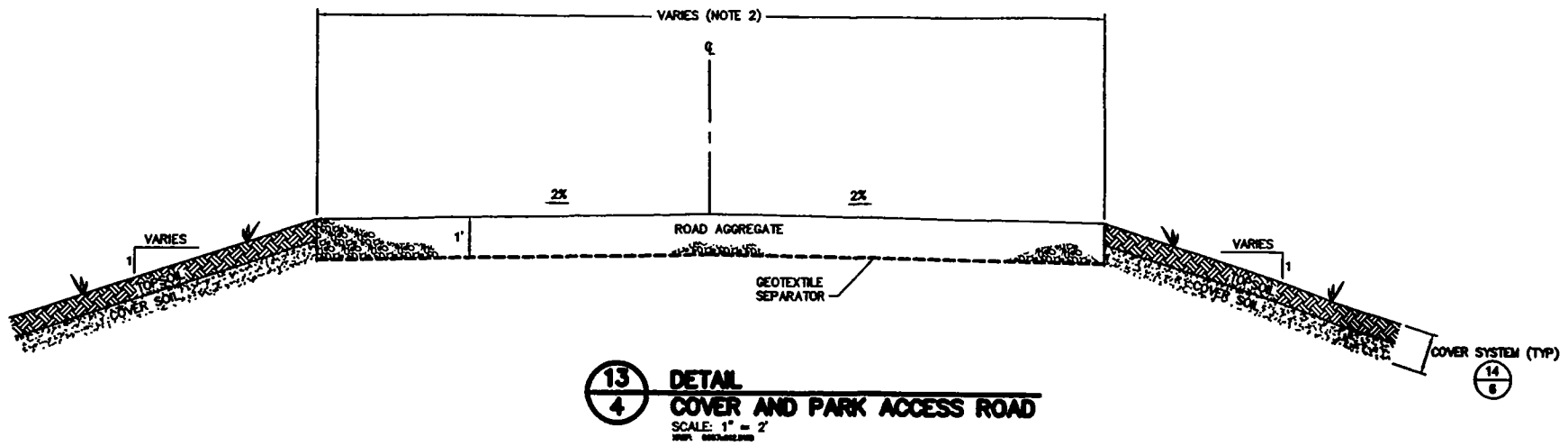
PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

SITE: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

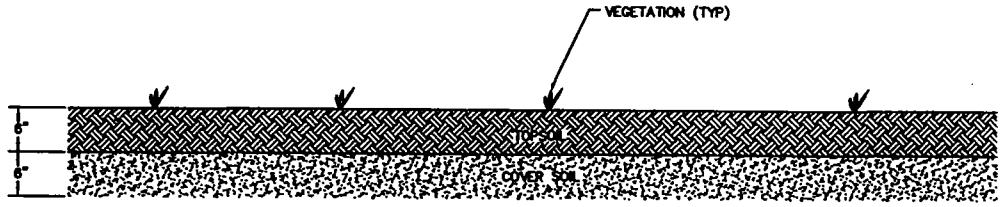
TITLE: GROUNDWATER EXTRACTION/RE-INJECTION SYSTEM DETAILS

MARK	DATE	REVISION	BY	APPROVED
⚠	JULY 2004	TITLE BLOCK CHANGE	MR	TK
⚠	DECEMBER 2000	UPDATE AND CLARIFY DETAILS	MLB	MLM
⚠	APRIL 1999	RESPONSE TO MARCH 1999 USEPA COMMENT NOS 24,25, AND 26	MAH	JPB

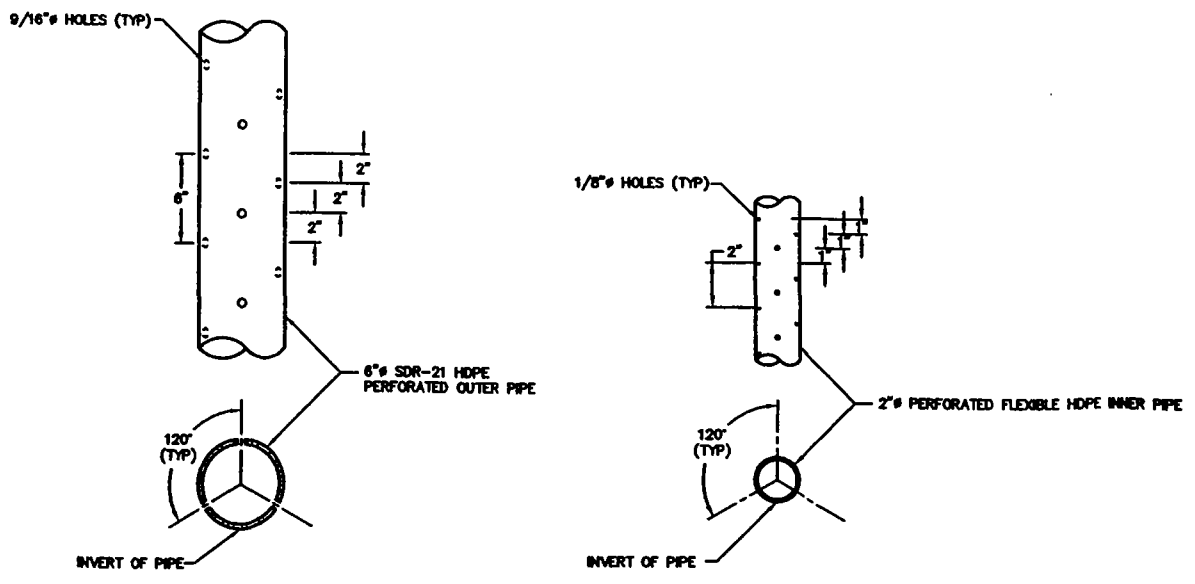
DATE: DECEMBER 2000	SCALE: AS SHOWN
DESIGNED BY: SMB/MLB	JOB NO.: TR0057-02
DRAWN BY: AMB/LB	FILE NO.: 0057-006
CHECKED BY: MLB/GB	REVISION: D
REVIEWED BY: TK	DRAWING NO.: 6 OF 7
APPROVED BY: MLM	



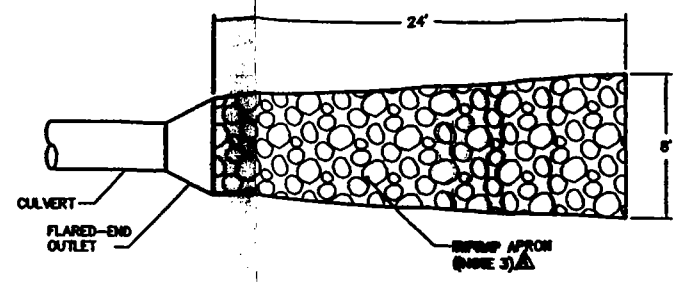
13/4 DETAIL
COVER AND PARK ACCESS ROAD
SCALE: 1" = 2'



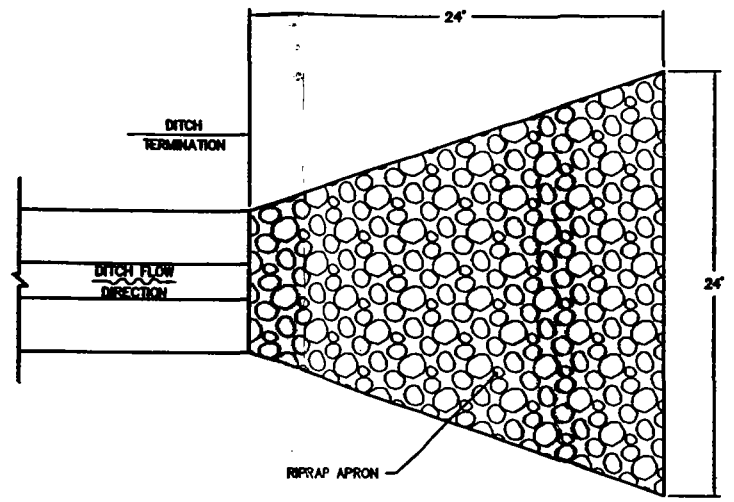
14/6 DETAIL
COVER SYSTEM
SCALE: 1" = 1'



15/6 DETAIL
PIPE PERFORATIONS
SCALE: N.T.S.



16/4 DETAIL
CULVERT OUTLET APRON
SCALE: NOT TO SCALE



17/4 DETAIL
DITCH OUTLET APRON△
SCALE: 1" = 5'

NOTES:

1. DETAILS ARE SHOWN TO SCALE AS NOTED EXCEPT FOR GEOSYNTHETICS, WHICH ARE SHOWN AT AN EXAGGERATED SCALE FOR CLARITY. MATERIAL TOLERANCES SHALL BE WITHIN THE LIMITS GIVEN IN THE SPECIFICATIONS.
2. ACCESS ROAD LEADING FROM ENTRANCE ON BLACKBURN ROAD TO THE INFILTRATION GALLERY SHALL BE 20-FT WIDE AS SHOWN ON DRAWING 4. ACCESS ROADS AND PARKING AREAS ON-SITE THAT ARE TO HAVE THEIR PAVEMENT REMOVED SHALL BE RE-BUILT TO THEIR ORIGINAL WIDTHS.

△3. RIPRAP SHALL HAVE D'50 = 6 IN. AND D'max = 12 IN. RIPRAP APRONS SHALL BE 12 IN. THICK AND SHALL BE UNDERLAIN BY GEOTEXTILE FILTER.

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GUELPH, ONTARIO, CANADA N1G 5G3

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

KEY PLAN: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: GENERAL DETAILS

MARK	DATE	REVISION	BY	APPROVED
△	JULY 2000	TITLE BLOCK CHANGE	MR	TK
△	DECEMBER 2000	UPDATE FIGURE NUMBERS	MLB	MLM
△	APRIL 2001	RESPONSE TO MARCH 2000 USEPA COMMENTS	SMG	JPB

DATE: DECEMBER 2000	SCALE: AS SHOWN
DESIGNED: SMG/MLB	JOB NO.: TR0057-42
DRAWN: AWS/AB	FILE NO: 0057-007
CHECKED: M.M/CB	REVISION: D
REVIEWED: TK	DRAWING NO: 7 of 7
APPROVED: M.M	

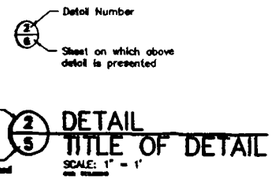
APPENDIX C

AS BUILT DRAWINGS FOR LANDFILL GAS VENTING TRENCH

SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

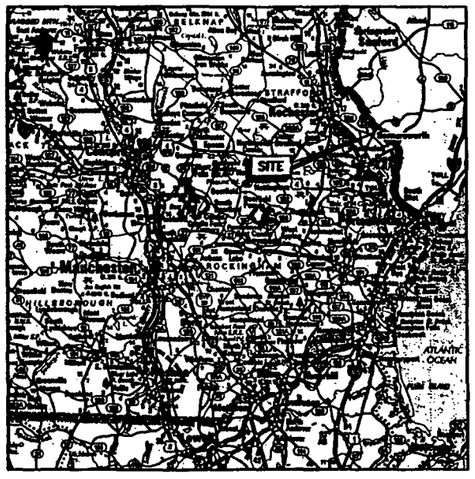
SOMERSWORTH, NEW HAMPSHIRE
CONSTRUCTION DRAWINGS
DESIGN FOR SOIL GAS VENTING SYSTEM
JUNE 2003

DETAIL IDENTIFICATION LEGEND



Example: Detail Number 2 presented on Sheet No. 6 was referenced for the first time from Sheet No. 5.

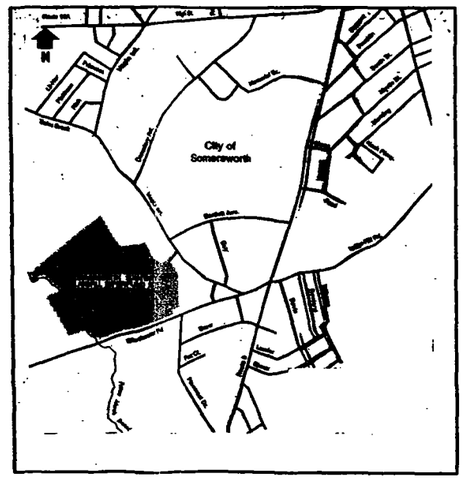
Note: Above system also applies to section identifications.



LOCATION MAP
0 10 MILES
SCALE

LIST OF DRAWINGS

DRAWING	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES/SUMMARY OF WORK
3	EXISTING SITE CONDITIONS
4	SOIL GAS TRENCH ALIGNMENT
5	SOIL GAS TRENCH PROFILE
6	SOIL GAS TRENCH CROSS-SECTION



VICINITY MAP
0 1000 FT.
SCALE

PREPARED FOR:

THE SOMERSWORTH LANDFILL SITE GROUP

PREPARED BY:

GEOSYNTEC CONSULTANTS

160 RESEARCH LANE, SUITE 206
GUELPH, ONTARIO, CANADA N1G 5B2
(519) 822-2230

PROJECT NUMBER TR0057-61
FILE NUMBER 0057-021
DRAWING NUMBER 1 OF 6

GENERAL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR COORDINATING AND MARKING EXISTING UTILITIES.
2. AIR MONITORING IS REQUIRED AT ALL TIMES DURING TRENCH EXCAVATION.
3. EXCAVATED SOILS SHALL BE SCREENED VISUALLY AND WITH A PHOTO-IONIZATION DETECTOR (PID) TO DETERMINE DISPOSAL LOCATION. ANY SOIL WITH VISUAL REFUSE MATERIAL OR WITH A PID READING ABOVE 5 PARTS PER MILLION (PPM) WILL BE CONSIDERED TO BE "CONTAMINATED" AND SHALL BE DISPOSED OF IN THE CONTAMINATED (WASTE) SOIL DISPOSAL AREA SHOWN ON SHEET 3. ALL OTHER EXCAVATED SOILS SHALL BE DISPOSED OF IN THE NON-WASTE SOIL DISPOSAL AREA SHOWN ON SHEET 3.
4. CONTRACTOR SHALL ESTABLISH TEMPORARY ACCESS ROAD BETWEEN THE TRENCH EXCAVATION AREA AND SOIL DISPOSAL AND STOCKPILE AREA. EQUIPMENT SHALL BE RESTRICTED TO USE OF TEMPORARY ACCESS ROAD DURING MATERIAL HANDLING ACTIVITY.
5. CONTRACTOR SHALL IMPLEMENT DUST CONTROL MEASURES FOR ALL TEMPORARY ACCESS ROADS. REFER TO SPECIFICATION SECTION 02030.
6. AS REQUIRED, REMOVE AND RE-ESTABLISH DISTURBED/EXISTING FEATURES SUCH AS GUARDRAIL AND CHAIN-LINK FENCE.
7. CONTRACTOR'S EQUIPMENT MUST BE WASHED IN EQUIPMENT DECONTAMINATION AREA PRIOR TO BEING DEMOBILIZED. EQUIPMENT SHALL BE DECONTAMINATED ACCORDING TO THE PROJECT SPECIFICATIONS.
8. ANY EXISTING FACILITY OR SITE FEATURE, (E.G., NATURAL GAS PIPELINE, GROUNDWATER WELLS, FENCING, ETC.), DAMAGED BY THE CONTRACTOR SHALL BE RESTORED OR REPLACED TO THE SATISFACTION OF THE SITE GROUP. THE CONTRACTOR SHALL BEAR THE ENTIRE COST OF RESTORATION AND/OR REPLACEMENT. CONSTRUCTION ACTIVITIES ADJACENT TO THESE FEATURES SHALL BE AS DESCRIBED IN THE SPECIFICATIONS.

SEQUENCE OF CONSTRUCTION:

1. ESTABLISH TEMPORARY EROSION CONTROL MEASURES. REFER TO SPECIFICATION SECTION 02270.
2. ESTABLISH TEMPORARY ACCESS ROADS.
3. ESTABLISH DECONTAMINATION AREA ADJACENT TO CONTAMINATED (WASTE) DISPOSAL AREA AS SHOWN ON SHEET 3.
4. ESTABLISH SOIL DISPOSAL AND STOCKPILE AREA(S) ADJACENT TO DECONTAMINATION AREA AS SHOWN ON SHEET 3. DISPOSAL AREA WILL REQUIRE EXCAVATION AND RE-INSTALLATION OF EXISTING PERMEABLE CAP. PERMEABLE CAP MATERIALS (TOPSOIL AND COVER SOIL) SHALL BE STOCKPILED TO THE EXTENT POSSIBLE FOR REUSE.
5. STRIP TOPSOIL, CLEAR BRUSH, AND GRUB STUMPS ALONG THE ALIGNMENT OF THE TRENCH SHOWN ON SHEETS 3 AND 4. STOCKPILE TOPSOIL, BRUSH, AND STUMPS IN SEPARATE AREAS OF THE SOIL DISPOSAL AND STOCKPILE AREA.
6. PERFORM EXCAVATION OF TRENCH BEGINNING FROM STATION 0+00. EXCAVATED SOIL SHALL BE TRANSPORTED TO THE SOIL DISPOSAL AND STOCKPILE AREA AS NECESSARY. INSTALL GEOMEMBRANE PANEL AND GEOTEXTILE, BACKFILL WITH GRAVEL, CLAY PLUG INCLUDING GEOTEXTILE SEPERATOR, AND TOPSOIL (SEE SHEET 6) ONCE AN APPROPRIATE LENGTH OF TRENCH HAS BEEN EXCAVATED. AT THE LOCATIONS INDICATED ON SHEET 6, INSTALL THE SOIL GAS VENT PIPES.
7. INSTALL ENCLOSURE AROUND EACH SOIL GAS VENT PIPE AS SHOWN ON SHEET 6.
8. REVEGETATE DISTURBED AREA OF TRENCH EXCAVATION.
9. REGRADE THE SOIL DISPOSAL AND STOCKPILE AREA TO BLEND IN WITH SURROUNDING CONTOURS. REPLACE APPROPRIATE THICKNESS OF PERMEABLE SOIL AND TOPSOIL AND REVEGETATE DISTURBED AREA.
10. REGRADE (IF NECESSARY) AND REVEGETATE ANY REMAINING AREAS DISTURBED DURING CONSTRUCTION (E.G. DECONTAMINATION AREA, TEMPORARY CONSTRUCTION ROADS, ETC.).

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160 Research Lane, Suite 206
Guelph, Ontario, Canada N1G 5B2

THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: GENERAL NOTES/SUMMARY OF WORK

MARK	DATE	REVISION	BY	APPROVED

THIS DRAWING MAY NOT BE USED FOR ANY PURPOSE OTHER THAN ITS ORIGINAL INTENT, UNLESS AUTHORIZED.

SIGNATURE

DATE

SEAL

DATE: JUNE 2003	SCALE:
DESIGNED BY: CRB	JOB NO: TR0057-61
DRAWN BY: CRB	FILE NO: 0057-022
CHECKED BY: MJM	REVISION: 0
REVIEWED BY: TK	DRAWING NO: 2 OF 6
APPROVED BY: MJM	

LEGEND

- 190 — OVERBURDEN PIEZOMETRIC SURFACE (FEET)
- 210 — EXISTING GROUND ELEVATION (FEET)
- ·213.1 — EXISTING SPOT ELEVATION (FEET)
- APPROXIMATE PROPERTY BOUNDARY (NOTE 3)
- PAVED ROAD
- UNPAVED ROAD
- WATER LINE
- TREELINE
- APPROXIMATE EXTENT OF WASTE (NOTE 3)
- APPROXIMATE EXTENT OF PERMEABLE CAP
- FENCE
- NATURAL GAS PIPELINE (NOTES 3,4)
- UTILITY POLE
- OB-7R● B-11R● CTW-10U● MONITORING WELL (NOTE 5)
- OB-16U● FS-4● MW-2● PIEZOMETER (NOTE 5)
- SGP-5 ✣ SOIL GAS PROBE
- WETLANDS
- PROPOSED SOIL GAS VENT TRENCH
- ▲ TRITECH CORP. BENCHMARK (NOTE 3)

NOTES:

1. TOPOGRAPHIC MAP AND RELATED SITE FEATURES COMPILED BY EASTERN TOPOGRAPHICS, INC. WOLFBORO, NEW HAMPSHIRE, BASED ON AERIAL PHOTOGRAPHY TAKEN IN FALL 1996. EXISTING TOPOGRAPHY SHOWN WITHIN THE APPROXIMATE EXTENT OF WASTE LINE WAS SURVEYED BY TRITECH ENGINEERING CORPORATION IN OCTOBER 2001.
2. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (AMSL), NGVD 1929. GRID COORDINATES CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
3. BENCHMARKS PROVIDED BY TRITECH ENGINEERING CORP. ON 25 FEBRUARY 2003 AND CORRESPOND TO THE MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 1927.
4. LOCATIONS OF PROPERTY BOUNDARY, NATURAL GAS PIPELINE, AND EXTENT OF WASTE BOUNDARY ARE APPROXIMATE, AND WERE TAKEN FROM FIGURE 1.2 OF THE SEPTEMBER 1998 CONCEPTUAL DESIGN REPORT, PREPARED BY BEAK INTERNATIONAL, INC., GUELPH, ONTARIO.
5. GROUNDWATER MONITORING WELL LOCATIONS WERE TAKEN FROM JULY 1998 DESIGN INVESTIGATION REPORT FOR THE PILOT STUDY AND SITE GROUNDWATER MONITORING PROGRAM, REMEDIAL DESIGN FOR PREFERRED REMEDIAL ACTION AT THE SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE, PREPARED BY BEAK INTERNATIONAL, INC.
6. OVERBURDEN PIEZOMETRIC SURFACE (I.E., WATER TABLE) IS APPROXIMATE AND SHOWS CONTOURS FROM SEPTEMBER 2001 (THE SEASONAL LOW GROUNDWATER LEVEL). SURFACE WAS TAKEN FROM FIGURE D-5 OF GEOSYNTEC CONSULTANTS "ANNUAL MONITORING AND DEMONSTRATION OF COMPLIANCE REPORT FOR 2001" DATED 6 FEBRUARY 2002. CONTRACTOR MAY PERFORM SITE INVESTIGATION AT THEIR OWN EXPENSE TO FURTHER DEFINE THE HYDROGEOLOGIC CONDITIONS THAT MAY BE ENCOUNTERED.
7. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF EXISTING CONDITIONS SHOWN ON THIS DRAWING.
8. EXISTING ACCESS ROAD MAY NEED UPGRADING IN CERTAIN AREAS. TEMPORARY SWALE CROSSINGS MAY BE NECESSARY.
9. LOCATIONS OF CTW WELLS (EXCLUDING CTW-1D , CTW-1S, CTW-2D, AND CTW-2S ARE APPROXIMATE AND WERE TAKEN FROM FIGURE 1 OF THE DESIGN REPORT.

150 75 0 150 300
SCALE IN FEET

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THE SOMERSWORTH LANDFILL SITE GROUP

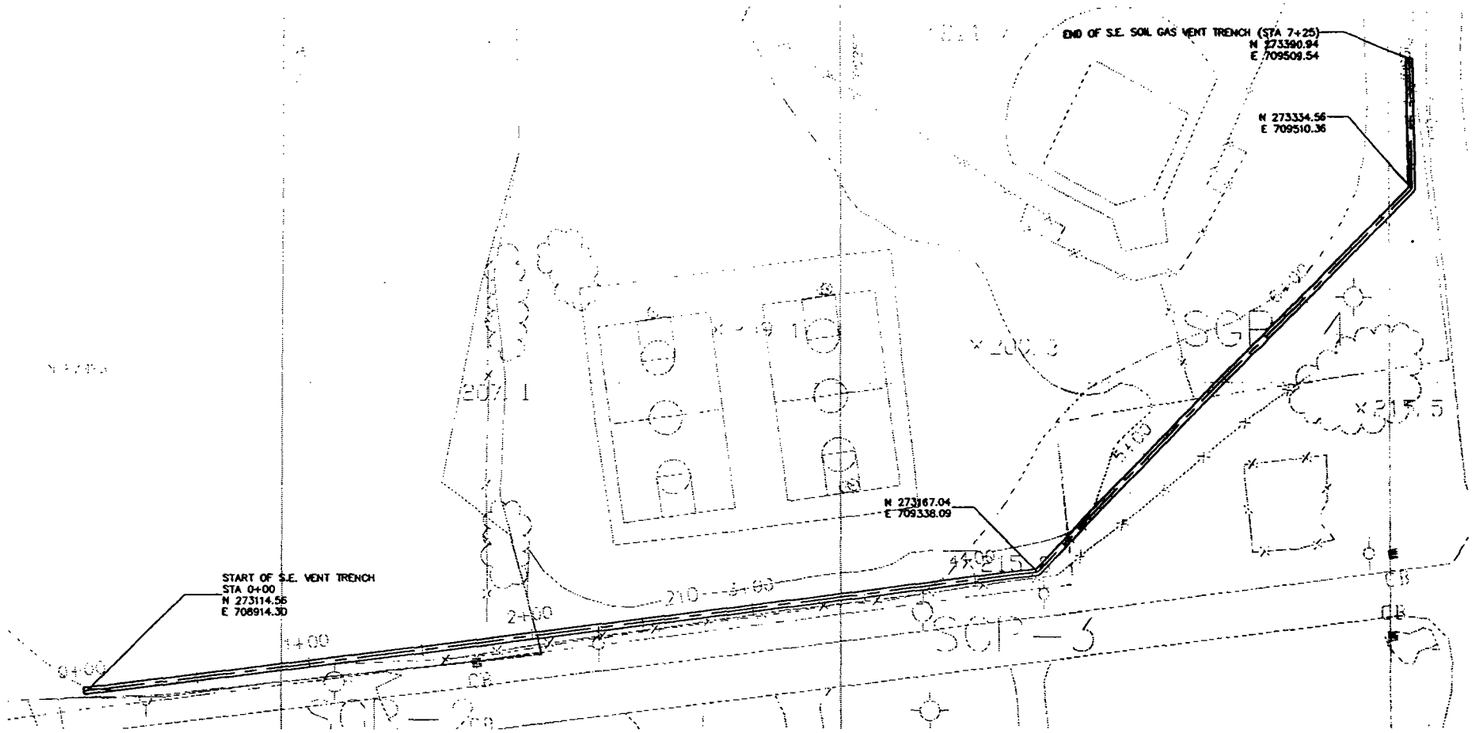
PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: EXISTING SITE CONDITIONS

MARK	DATE	REVISION	BY	APPROVED

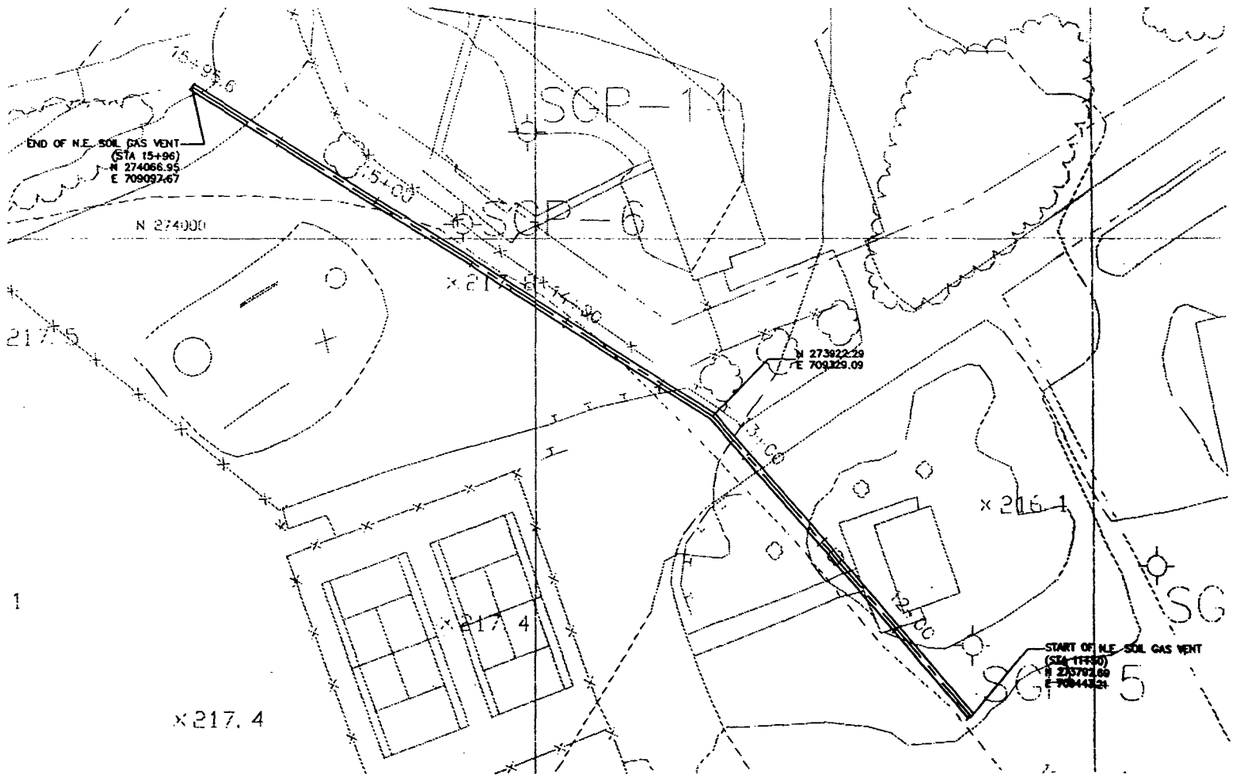
DATE:	JUNE 2003	SCALE:	1" = 150'
DESIGNED:	CRB	JOB NO.:	TR0057-61
DRAWN:	CRB	FILE NO:	0057-023
CHECKED:	MJM	REVISION:	0
REVIEWED:	TK	DRAWING NO:	3 of 6
APPROVED:	MJM		



PLAN
SOIL GAS VENT
SOUTHEAST SEGMENT

SCALE: 1" = 30'

NORTH



PLAN
SOIL GAS VENT
NORTHEAST SEGMENT

SCALE: 1" = 30'

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THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: SOIL GAS VENT ALIGNMENT

MARK	DATE	REVISION	BY	APPROVED

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DATE:	JUNE 2003	SCALE:	
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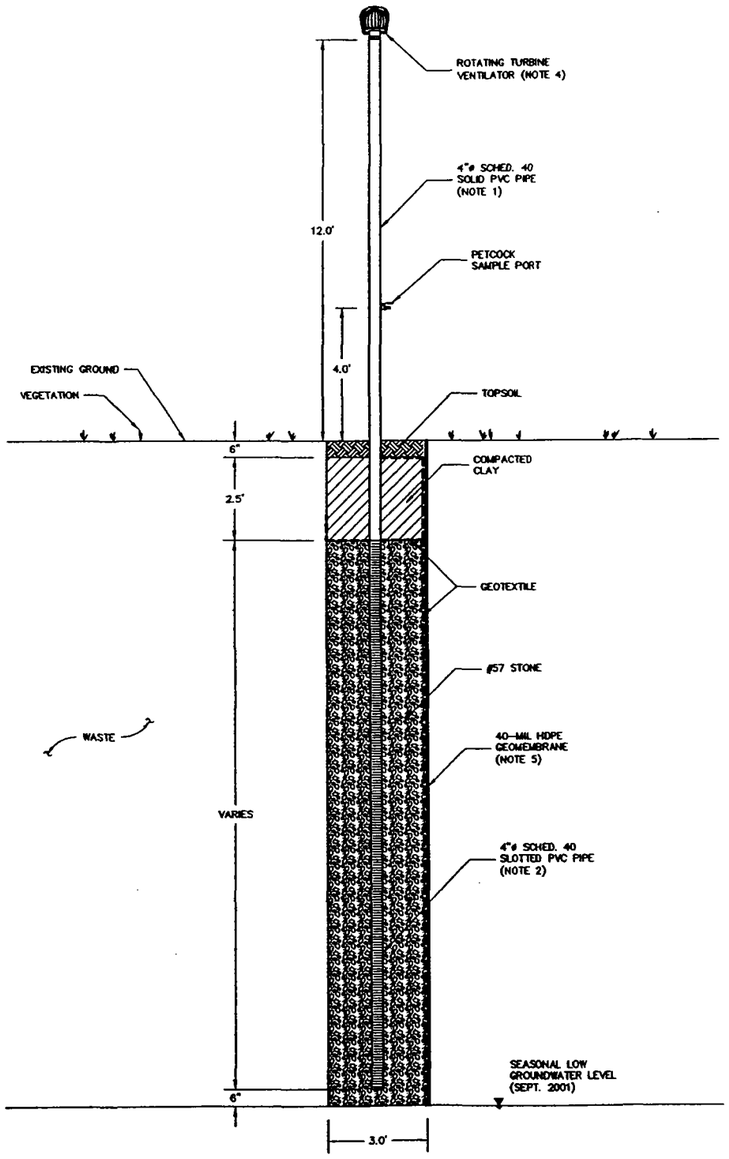
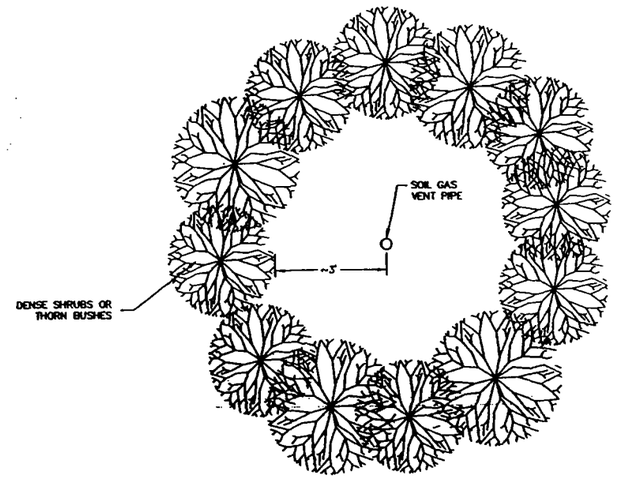
CHECKED BY:	MJM	REVISION:	0
REVIEWED BY:	TK	DRAWING NO:	4 OF 6
APPROVED BY:	MJM		



1 — DETAIL
SOIL GAS VENT
SCALE: 1" = 2'



2 — DETAIL
VENT PIPE PROTECTION
SCALE: 1" = 2'

NOTES:

1. SOLID PVC PIPE SECTIONS ABOVE THE GROUND SURFACE SHALL BE COATED WITH UV PROTECTANT (E.G. LIGHT COLORED ACRYLIC OR LATEX PAINT COMPATIBLE WITH PVC).
2. SLOTTED PVC PIPE SECTIONS SHALL HAVE A MAXIMUM SLOT SIZE OF 1/8 INCH. SLOTTED PVC PIPE SHALL EXTEND UP TO THE BOTTOM OF COMPACTED CLAY LAYER.
3. VENT PIPES ARE LOCATED AT THE FOLLOWING STATIONS:
   FOR SOUTHEAST TRENCH: 0+75, 2+75, 4+75, AND 6+75.
   FOR NORTHEAST TRENCH: 12+00, 14+00, AND 16+00.
4. ROTATING TURBINE VENTILATORS SHALL BE A 4-INCH THROAT SIZE "EMPIRE TURBINE VENTILATOR" OR EQUIVALENT.
5. SMOOTH GEOMEMBRANE SHALL BE USED IF RIVER-RUN (ROUNDED) NO. 57 STONE IS USED. TEXTURED GEOMEMBRANE WITH GEOTEXTILE TO PROTECT THE GEOMEMBRANE SHALL BE USED IF CRUSHED NO. 57 STONE IS USED.

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THE SOMERSWORTH LANDFILL SITE GROUP

PROJECT: CONSTRUCTION DRAWINGS
DESIGN FOR PREFERRED REMEDIAL ACTION

WORK: SOMERSWORTH SANITARY LANDFILL SUPERFUND SITE

TITLE: SOIL GAS TRENCH CROSS-SECTION AND DETAILS

ISSUE	DATE	REVISION	BY	APPROVED

DATE:	JUNE 2003
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JOB NO.:	TR0057-61
FILE NO:	0057-026
REVISION:	0
DRAWING NO:	6 of 6

APPENDIX D

GROUNDWATER MANAGEMENT ORDINANCE AND FIGURE

CITY OF SOMERSWORTH, NEW HAMPSHIRE

CHAPTER 19 - ZONING ORDINANCE

ADOPTED BY SOMERSWORTH CITY COUNCIL - AUGUST 30,1989

AMENDED:

MARCH, 1990
AUGUST, 1990
SEPTEMBER, 1990
JANUARY, 1991
APRIL, 1991 MAY, 1991
SEPTEMBER, 1991
MAY, 1992
SEPTEMBER, 1992
JULY, 1993
SEPTEMBER, 1993
FEBRUARY, 1994
APRIL, 1994
JULY, 1994
FEBRUARY, 1995
OCTOBER, 1995
JANUARY, 1996
JULY 15, 1996
JUNE 2, 1997
APRIL 6, 1998
JUNE 1, 1998
JANUARY 18, 1999
OCTOBER 19,1999
JANUARY 10, 2000
APRIL 17, 2000
AUGUST 14, 2000
DECEMBER, 2000
MARCH, 2001
MAY 21, 2001
OCTOBER 7, 2002
OCTOBER 21, 2002
MAY 3, 2004
MARCH 21, 2005

CITY OF SOMERSWORTH

CHAPTER 19 – ZONING ORDINANCE

Amended March, 1990:
Pages 1, 2, 3,13,14, 52, 56,60 through 74. 83. 84, 85. Also, tables 4.A.1; 4.A.2; 4.A.3; 4.A.4; 4.A.5. Note #5; 5.A.1.;5.A.2.

Amended August, 1990:
Section 7, pages 16 thru 23.

Amended September, 1990:
Section 17, pages 63 thru 67. Table 5.A.1 and Table 5.A.1 Notes.

Amended January 7, 1991:
Section 20, page 89 - Zoning Board of Adjustment.

Amended April 1, 1991:
Section 18.C.4.e. - Political Signs.

Amended May 20, 1991:
Section 3.D., Page 5 - Commercial/Industrial District; Table of Uses, Tables 4.A.2; 4.A.3; 4.A.4; 4.A.5; 5.A.1.

Amended September 16, 1991:
Section 12, pages 46 thru 54 - Wetlands Conservation Overlay District.

Amended May 4, 1992:
Section 13, pages 53 thru 58 - Historic District.

Amended September 21, 1992:
Section 8, pages 24, 26 and 28 - Home Occupations.

Amended July 26, 1993:
Section 21, page 93 - Definitions; Table 4.A.4.

Amended September 7, 1993:
Section D.2., page 5 - Commercial/Industrial District.

Amended February 28, 1994:
Section 3. D.2., pages 5 & 6 - Commercial/Industrial District. Section 14, pages 60 thru 62 - Sexually Oriented Businesses (new). Section 18, page 71 on (19 pages) - Sign Regulations. Table of Uses - Table 4.A.5 (at end of chapter)

Amended April 4, 1994:
Table of Uses - Table 5.A.1 and Table 5.A.1 Notes.

Amended July 18, 1994:
Sections 11.B.4. & 11.B.5. (page 39); 11.B.8.f.& 11.B.9. (Pages 42 & 43); 11.c.(Pages 45 & 45A).

Amended February 21, 1995:
All pages renumbered to correspond with section numbers.
Table of Contents.
New Section added - "Section 15, Commercial Node District" (pages 15.1 thru 15.3).
Section 15 through Section 23 renumbered to Section 16 through Section 24.
Add Section 3.B.16. (page 3.3).
Add Section 3.D.8. (page 3.9).
Section 20.A.1. (page 20.1).
Section 20.B.3. (pages 20.1 & 20.2).
Section 20.B.3.h. (page 20.3).
Section 22 (pages 22.1 thru 22.9).
Tables 5.A.1&5.A.2

Amended October 2, 1995:
Added new Section 11 - Excavation of Earth Products (pages 11.1 to11.4)
Section 11 through Section 24 renumbered to Section 12 through Section 25.

Amended January 10, 1996:
Add Section 3.B. 15 (page 3.3).
Add new Section 16 - Recreation District (pages 16.1 thru 16.3).
Renumber all sections and pages after section 16 to reflect this change.
Section 24 (page 24.2).
Table 5.A. 1 Notes (page 8).

Amended July 15, 1996:
Delete Section 20 - Landscaping and Buffer Requirements, in its entirety.
Delete Section 22 - Circulation and Parking Regulations and replace with Section 21 – Circulation And Parking Regulations (page 21.1).
Renumber Section 23 through Section 26 to Section 22 through 25.

Amended June 2, 1997:
Section 8.D. (page 19:18)
Section 8.F.3. (page 19:18)
Section 8.F.6. (page 19:19) delete second paragraph
Table 4.A.3 & Note #6 (page 19:77)

Amended April 6, 1998:
Section 23 - Definitions (pages 68 and 70)
Table 4.A.3 and 4.A.5
Amended June 1, 1998:
Section 20 Sign Regulations - page 60.

Amended January 18, 1999:
Table 4.A.4 and 4.A.5

Amended October 19, 1999:

Added new Section 23 Naming of Public Streets and Rights of Way – pages 72-75

Renumbered Section 23 Definitions to Section 24 - pages 76-82. Renumbered Section 24 Administration & Enforcement to Section 25 - page 83. Renumbered Section 25 Interpretation, Conflicts & Separability to Section 26 - pages 84&85.

Amended January 10, 2000:
Section 8 Home Occupations - pages 18,19 & 21.
Section 10 Groundwater Protection District - pages 25 & 26.

Amended April 1, 2000:
Section 8 Home Occupations - pages 18,19 & 21.

Amended August 14, 2000:
Section 9 - Manufactured Housing District - pages 23 thru 24C. Table 4.A.5- pages 91 &92.

Amended December 11, 2000:
Section 12 - Flood Plain District - pages 32 thru 38A.

Amended March 19, 2001:
Section 3.A. - Districts - page 1.
Section 3.B.7. (deleted) - page 2.
Section 3.D.10. and 3.D.10.a. - (new) - page 7.
Section 24.NN. and 24.PP (delete) - page 79 and 80.
Tables 4.A.1. through 5.A.2 - pages 86 through 94.

Amended May 21, 2001:
Section 19.3.A. - Districts - page 1.
Section 19.3.B.14. - Purpose of Districts - page 3.
Section 19.3.D.11. - District Boundaries - page 7.
Section 19.3.D.12. - District Boundaries - pages 7 & 8.
Section 19.21. - Circulation & Parking Regulations - page 70.
Tables 4.A.1,4.A.2,4.A.3,4.A.4,4.A.5,5.A.1 - pages 85 thru 92.

Amended October 7, 2002:
Added new Section 24 Common Driveway Subdivision – pages 78 and 79.
Renumbered Section 24 thru Section 26 to Section 25 thru Section 27.

Amended October 21, 2002:
Table 4.A.3. – page 90

Amended 5/03/2004:
Section 7, Cluster Subdivision – pages 12 thru 17. Changed Cluster Subdivision to read Conservation Residential Development throughout Section.
Sections 20.D.2.a, 20.D.2.e, 20.D.2.f – page 68.
Section 20.D.4 – page 70.
Section 25, Definitions – pages 80 thru 84.
Added new Section 26, Telecommunication Facilities – pages 86 thru 93.
Amended Table of Uses (Table 4.A.3), page 98.
Amended Table of Uses (Table 4.A.5), pages 101 & 102.

Amended 3/21/2005:
Section 19.12.A. Flood Plain District, Applicability – page 34.
Section 19.14.H.2. Historic District, Appeal Process – page 52.
Section 19.20.B.13. Sign Regulations, Flashing Sign – page 61.
Section 19.20.C.2.e. Sign Regulations – page 63.
Section 19.20.C.4.a. Sign Regulations – Banner Signs – page 64.
Section 19.25.Y. Definitions, Dwelling Unit – page 82.
Section 19.25.DD. Definitions, Frontage – page 82.
Section 19.27.C. & 19.27.E. Administration & Enforcement – page 94.
Table 4.A.1. – page 96.

Section 10 Groundwater Protection District

19.10.A. AUTHORITY. In accordance with New Hampshire Revised Statutes Annotated (RSA) Chapter 4-C:22 III, as the same may be subsequently amended, the City of Somersworth hereby adopts the following Groundwater Protection District.

19.10.B. PURPOSE. The purpose of this ordinance is, in the interest of public health, safety and general welfare, to protect, preserve and maintain the existing and potential groundwater supply and groundwater recharge areas within the known aquifer from adverse development, land use practices or depletion, and to allow for the restoration of degraded ground water by the establishment of a "Ground Water Management Zone".[1]

19.10.C. LOCATION.

19.10.C.1. The boundaries of the Groundwater Protection District shall be the outermost edge of the out wash deposits of the "Lily Pond Aquifer", as designated in the "Report on Aquifer Definition Lily Pond Aquifer Somersworth, New Hampshire," prepared by BCI Geonetics, Inc., and included in the Water Master Plan Update dated June1984. The Ground Water Management Zone is designated by the Ground Water Management Zone Overlay Map included in the Preferred Remedial Action 100% Design and Demonstration of Compliance Plan prepared by Beak International, Inc. and Geo Syntec Consultants International, Inc.[1]

19.10.C.2. When the actual boundary of the Groundwater Protection District is in dispute by any owner or abutter actually affected by said boundary, the Planning Board, at the owner/abutter's expense and request, may engage a professional geologist or hydrologist to determine more accurately the precise boundary of said Groundwater Protection District.

19.10.D. APPLICABILITY.

19.10.D.1. All land use activities and development conducted within the Groundwater Protection District shall be regulated by the standards established herein.

19.10.D.2. The standards established herein shall constitute the rules of an overlay zone and shall be superimposed over other zoning districts or portions thereof. The provisions herein shall apply in addition to all other applicable ordinances and regulations. In the event of a conflict between any provision herein and any other ordinance or regulation, the more restrictive requirement shall control.

19.10.E. DEFINITIONS.

19.10.E.1. Animal Feed Lots. A plot of land on which 25 livestock or more per acre are kept for the purpose of feeding.

19.10.E.2. Groundwater. Water in the subsurface zone at or below the water table in which all pore spaces are filled with water.

19.10.E.3. Groundwater Management Zone (GMZ). The subsurface volume in which ground water contamination associated with a discharge of a regulated contaminant is contained. (State of NH Groundwater Protection Rules - Env - WS410.)[2]

[1] Amended 1/10/2000.
[2] Passed 1/10/2000.

19.10.E.4. Hazardous and Toxic Materials. Those materials that pose a present or potential hazard to human health and the environment when improperly stored, transported or disposed of. These materials include those listed in the New Hampshire Hazardous Waste Regulations. Third Edition. Appendixes 1-4, 1985, New Hampshire Dept. of Environmental Services, Concord, as the same may be subsequently amended.

19.10.E.5 Impervious Surface. A surface covered by any material (such as pavement, cement, roofing) that prevents surface water from penetrating the soil directly.

19.10.E.6. Leachable Wastes. Waste materials including solid wastes, sewage, sludge, and agricultural wastes that are capable of releasing waterborne contaminants to the surrounding environment.

19.10.E.7. Solid Waste. Discarded solid material with insufficient liquid content to be free flowing. This includes but is not limited to rubbish, garbage, scrap materials, junk, refuse, inert fill material and landscape refuse.

19.10.F. PROHIBITED USES. The following uses are expressly prohibited from the Groundwater Protection District:

19.10.F.1. Within the Lily Pond Aquifer[1]

19.10.F.1.a. The disposal of solid waste including landfills and sewage lagoons, excepting disposal of stumps and brush;

19.10.F.1.b. Storage of road salt or other deicing chemicals except in a property constructed shelter for use on site;

19.10.F.1.c. Dumping of snow containing road salt or other deicng chemicals;

19.10.F.1.d. Motor vehicles service or repair shops;

19.10.F.1.e. Junk and salvage yards;

19.10.F.1.f. Animal feedlots;

19.10.F.1.g Commercial or industrial handling, disposal, storage or recycling of hazardous or toxic materials or wastes; and

19.10.F.1.h Underground storage or petroleum or any refined petroleum product. All existing underground tanks, including those under 1,100 gallons, must be registered with the Somersworth Fire Department within six months of the enactment of this regulation. Existing tanks over 1,100 gallons are subject to Water Supply and Pollution Control Commission regulation, pursuant to New Hampshire Code of Administration No. W5411.

19.10.F.2. Within the Groundwater Management Zone:

19.10.F.2.a. The requirements, restrictions, and prohibition of the underlying Zoning District shall continue to apply to the extent that they are not inconsistent with the provision of this section; and[2]

19.10.F.2.b. Pumping of ground water from any well, trench, sump or other structure for residential, irrigation, agricultural or industrial purpose is prohibited.[2]

19.10.G. SPECIAL CONDITIONS. The following conditions shall apply to all uses in the Groundwater Protection District:

[1] Added 1/10/2000.
[2] Passed 1/10/2000.

19.10.G.1. A lot shall not be rendered more than ten percent (10%) impervious. A proposed development plan which will incorporate a stormwater drainage plan, approved by the City of Somersworth Planning Board and prepared by a professional engineer certified to practice in the State of New Hampshire shall be provided. The plan shall provide for the on-site retention and percolation of all development generated stormwater runoff from a ten (10) year storm. Furthermore, the stormwater drainage plan shall provide for the filtering of parking area runoff to remove oil, gasoline and other impurities prior to retention and percolation of the runoff;

19.10.G.2. Development or land use activities proposed within the Groundwater Protection District shall be connected to the municipal sewage disposal system and the municipal water system;

19.10.G.3. Any use retaining less than thirty percent (30%) of lot area, regardless of size, in its natural vegetative state with no more than minor removal of existing trees and vegetation shall require a special permit;

19.10.G.4. Mining operations, including sand and gravel removal, shall require an Earth Removal Permit, pursuant to New Hampshire Revised Statutes Annotated Chapter 155-E, which is herein incorporated by reference. Such excavation or mining shall in no case be carried out within eight (8) vertical feet of the seasonal high water table; and

19.10.G.5. The storage of petroleum or related products in a freestanding fuel oil tank within or adjacent to a residential structure which is used for the normal heating of said structure shall be permitted pursuant to the conditions outlined in subsection H below, and all applicable state regulations. All tanks shall be protected from internal and external corrosion and shall be of a design approved by the Somersworth Fire Department. All freestanding tanks shall be placed on an impermeable surface such as a concrete pad. No tank may be abandoned in place. A tank shall be disposed of after emptied of all hazardous materials if it has been out of service for a period in excess of twelve (12) months. The product and the tank shall be disposed of by the property owner as directed by the Somersworth Fire Department and all applicable state laws. All leaking tanks must be emptied by the owner or operator within twelve (12) hours after detection of the leak and removed by the owner and/or operator as per above.

19.10.H. ADMINISTRATION.

19.10.H.1. Development or land use activities proposed within the Groundwater Protection District that require a special permit, as provided in subsection G above, shall be reviewed' by both the Planning Board and the Somersworth Conservation Commission. The Planning Board shall either approve, conditionally approve or disapprove a special permit only after it determines that the proposed land use development and/or activities comply with the purpose of this regulation In making such a determination, the Planning Board shall give consideration to the simplicity, reliability and feasibility of the control measures proposed and the degree of threat to groundwater quality if the control measures failed.

19.10.H.2. Development or land use activities proposed within the Groundwater Protection District that require subdivision or site plan approval from the Planning Board shall also be reviewed by the Somersworth Conservation Commission. The Planning Board and the Conservation Commission shall verify that the proposed activity will conform to the provisions of this regulation ordinance prior to action by the Planning Board to approve, conditionally approve or disapprove the application.

19.10.H.3. The Building Inspector shall not issue a building permit for development or land use activities until such time as he/she verifies that the proposed activity will conform to the provisions of this ordinance. The Building Inspector may consult with the Planning Board and/or Conservation Commission as he/she deems necessary.

19.10.H.4. Land use activities that do not require the receipt of Panning Board approval or building permits shall nonetheless be subject to the requirements and standards established herein.

19.10.H.5. A hydrogeologic study may be required by the Planning Board and/or the Conservation Commission to investigate the impacts a proposed development or land use activity will have on an existing or future groundwater supply. A qualified professional hydroiogist or geologist shall be chosen by the City of Somersworth and the applicant for approval shall pay any and all costs incurred.

19.10.H.6. For all freestanding fuel oil tanks as permitted per Section 7. F., the property owner shall file with the City of Somersworth the following information prior to the installation of a tank:

19.10.H.6.a. The size of the tank;

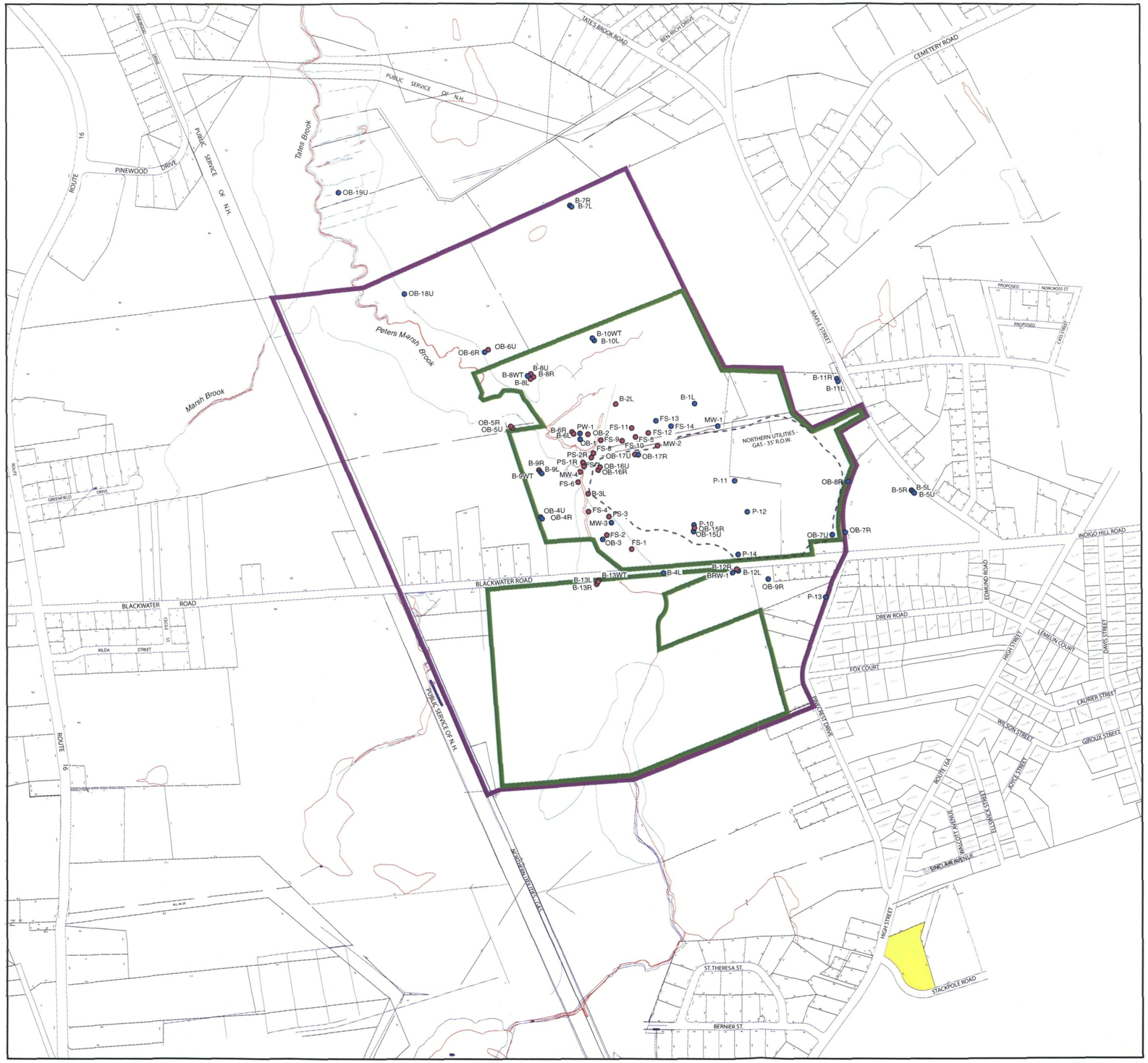
19.10.H.6.b The type of tank;

19.10.H.6.c. The type of material being stored and its quantity;

19.10.H.6.d. The location of each tank on the premises, complete with a sketch map; and

19.10.H.6.e. The age of each tank.

19.10.I. ENFORCEMENT. If the Planning Board and/or the Building Inspector finds that any of the requirements and standards established herein are in violation, the Building Inspector shall order the owner, in writing, to make such corrections as he/she deems necessary to bring the development and activities into compliance with the provisions of this ordinance. Such order shall be complied with within twenty-four (24) hours of the original notice to the owner. Where the owner fails to comply with the order of the Building Inspector, a fine of one hundred dollars ($100) per day, or the maximum amount which is authorized by statute, may be levied against said owner. The fine shall be retroactive and shall begin to accrue on the date on which the property owner receives written notice from the Building Inspector that he/she is in violation of this ordinance.



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)

0 300 600
(approximate scale)

Groundwater Management Zone
Somersworth Landfill Superfund Site, Somersworth, NH

June 2005 | Figure: **7.1** | GeoSyntec Consultants

Layers: 00 01 03 04 04A 05 06 08 SOMMERS2taxmap copy.ai

TABLE D.1
Property Owners Within the GMZ
Somersworth Sanitary Landfill Superfund Site, Somersworth NH

GeoSyntec Consultants

Property Owner	Address	City State Zip	Location & ID
ALMEIDA STEVEN L + SUZANNE J	26 PINECREST DR	SOMERSWORTH NH 03878-1413	Loc: 26 PINECREST DR Parcel ID #: 35 11 0
ANDRIAN WILLY	26 BLACKWATER RD	SOMERSWORTH NH 03878-1504	Loc: 26 BLACKWATER RD Parcel ID #: 35 13A 0
BALL JAMES T	PO BOX 62	SOMERSWORTH NH 03878	Loc: 92 BLACKWATER RD Parcel ID #: 35 18 0
BARRY WILLIAM J + MELISSA F	93 BLACKWATER RD	SOMERSWORTH NH 03878-1519	Loc: 93 BLACKWATER RD Parcel ID #: 34 2A 0
BOWLEY PAULINE M + RALPH E / TRUSTEES REVOCABLE TRUST	81 BLACKWATER RD	SOMERSWORTH NH 03878-1519	Loc: 81 BLACKWATER RD Parcel ID #: 34 07 0
DEMOTT RITA J	22 PINECREST DR	SOMERSWORTH NH 03878-1413	Loc: 22 PINECREST DR Parcel ID #: 35 09 0
FOSTER JULIA M	94 BLACKWATER RD	SOMERSWORTH NH 03878-1504	Loc: 94 BLACKWATER RD Parcel ID #: 35 17 0
FRANCOEUR REALTY TRUST /	17 PARKVIEW TER	SOMERSWORTH NH 03878-1516	Loc: 9 PARK VIEW TER Parcel ID #: 22 50A 0
GAGNE ROGER + JANET C	81A BLACKWATER RD	SOMERSWORTH NH 03878-1519	Loc: 81 A BLACKWATER RD Parcel ID #: 34 03 0
HAMEL ROGER + SUSAN	28 BLACKWATER RD	SOMERSWORTH NH 03878-1504	Loc: 28 BLACKWATER RD Parcel ID #: 35 13B 0
HOWARD DONALD L + JOAN /	24 PINECREST DR	SOMERSWORTH NH 03878-1413	Loc: 24 PINECREST DR Parcel ID #: 35 10 0
HUYN PHI	24 BLACKWATER RD	SOMERSWORTH NH 03878-1504	Loc: 24 BLACKWATER RD Parcel ID #: 35 13 0
LACHARITE DONALD L + PATRICIA	83 BLACKWATER RD	SOMERSWORTH NH 03878-1519	Loc: 83 BLACKWATER RD Parcel ID #: 34 06 0
LETARTE GERARD E	1 BERNIER ST	SOMERSWORTH NH 03878-1001	Loc: BLACKWATER RD Parcel ID #: 34 09 0
LIBBY JEFFREY W + CAROLYN	28 1/2 BLACKWATER RD	SOMERSWORTH NH 03878-1504	Loc: 28 1\2 BLACKWATER RD Parcel ID #: 35 13C 0
MEDICAL MILE LLC / ~NH REAL ESTATE	350 ROUTE 108 SUITE 210	SOMERSWORTH NH 03878	Loc: 241 RT 108 Parcel ID #: 45 01 0
MURRAY FRANK A + DONNA M	38 PINECREST UNIT 2	SOMERSWORTH NH 03878	Loc: 5 WEXFORD LANE Parcel ID #: 35 12A 0
MURRAY FRANK A + DONNA M	38 PINECREST UNIT 2	SOMERSWORTH NH 03878	Loc: 7 WEXFORD LANE Parcel ID #: 35 12B 0
MURRAY FRANK A + DONNA M	38 PINECREST UNIT 2	SOMERSWORTH NH 03878	Loc: 38 PINECREST DR Parcel ID #: 35 12C 0
MURRAY FRANK A + DONNA M	38 PINECREST UNIT 2	SOMERSWORTH NH 03878	Loc: 32 PINECREST DR Parcel ID #: 35 12D 0
NEWMAN GEORGE C + LINDA	85 BLACKWATER RD	SOMERSWORTH NH 03878-1519	Loc: 85 BLACKWATER RD Parcel ID #: 34 05 0
PUBLIC SERVICE CO OF NH/TAX AC	1000 ELM ST - PO BOX 330	MANCHESTER NH 03105-0330	Loc: 17 BLACKWATER RD Parcel ID #: 22 09 0
REGINOD REAL ESTATE LLC / %NADCO	P O BOX 130	DOVER NH 03820-0130	Loc: 52 WILLAND, EAST DR Parcel ID #: 35 19 0
ROBIDAS DANIEL G + HEIDI A	87 BLACKWATER RD	SOMERSWORTH NH 03878	Loc: 87 BLACKWATER RD Parcel ID #: 34 5A 0
SHAW STANLEY I + HELEN T TSTEE / 50% REVOCABLE TRUST OWNERS	26 VAN BUREN AVE	PORTSMOUTH NH 03801	Loc: 97 BLACKWATER RD Parcel ID #: 34 01 0
SMITH PETER R + ELLEN	28 PINECREST DR	SOMERSWORTH NH 03878-1413	Loc: 28 PINECREST DR Parcel ID #: 35 11A 0
SULLIVAN CATHERINE / MCDONOUGH STEPHEN M	28 FRANKLIN ST APT 211	SOMERSWORTH NH 03878-3251	Loc: 89 BLACKWATER RD Parcel ID #: 34 04 0
TURCOTTE JEFFREY S + NANCY T /	14 WESTWOOD DR	SOMERSWORTH NH 03878-1538	Loc: 14 WESTWOOD DR Parcel ID #: 34 08 0
VALLEE JEANNETTE	95 BLACKWATER RD	SOMERSWORTH NH 03878-1519	Loc: 95 BLACKWATER RD Parcel ID #: 34 02 0
VINCENT KENNETH S / BUKOVSKEY LYNNE	19 VINCENT WAY	SOMERSWORTH NH 03878	Loc: 19 VINCENT WAY Parcel ID #: 34 3A 0
PENTA K REALTY TRUST	247 CONCORD RD	WAYLAND MA 01778	Loc: 100 BLACKWATER RD Parcel ID # 44 01 0
JESSE K HARDY	PO BOX 130	DOVER NH 03820	Loc: 19 SHERWOOD GLEN Parcel ID # 35 19A 0
AIKENS MARGARET L / AIKENS MARGARET J	34 BLACKWATER RD	SOMERSWORTH NH 03878	Loc: 34 BLACKWATER RD Parcel ID # 35 15 0
CITY OF SOMERSWORTH	1 GOVERNMENT WAY	SOMERSWORTH NH 03878	Loc: PINEWOOD DR Parcel ID # 46 04 0
DAIGLE WYNNE	1290 SO MILITARY TRAIL 412	DEERFIELD BEACH FL 33442	Loc: WESTWOOD DR Parcel ID # 33 02 0
CITY OF SOMERSWORTH	1 GOVERNMENT WAY	SOMERSWORTH NH 03878	Loc: TATES BROOK RD Parcel ID # 33 04 0

APPENDIX E

WELL CONSTRUCTION LOG FOR BRW-1

DRAFT

WELL CONSTRUCTION LOG

PROJECT	PROJECT NUMBER	WELL NUMBER
GE Somersworth	8110-003	BRW-1

SITE	COORDINATES	GROUND SURFACE ELEVATION	CASING STICKUP
Somersworth Sanitary Landfill			2.0'

Soil Boring Cross-Reference BRW-1
Town and City Somersworth
County and State Strafford County, New Hampshire

Installation Date (s) 4/4/96

Drilling Method Drive & Wash/Air Rotary
Drilling Contractor New Hampshire Boring
Drilling Fluid Water

Development Technique (s) / Dates
Overpumping and surging/ 4/5/96

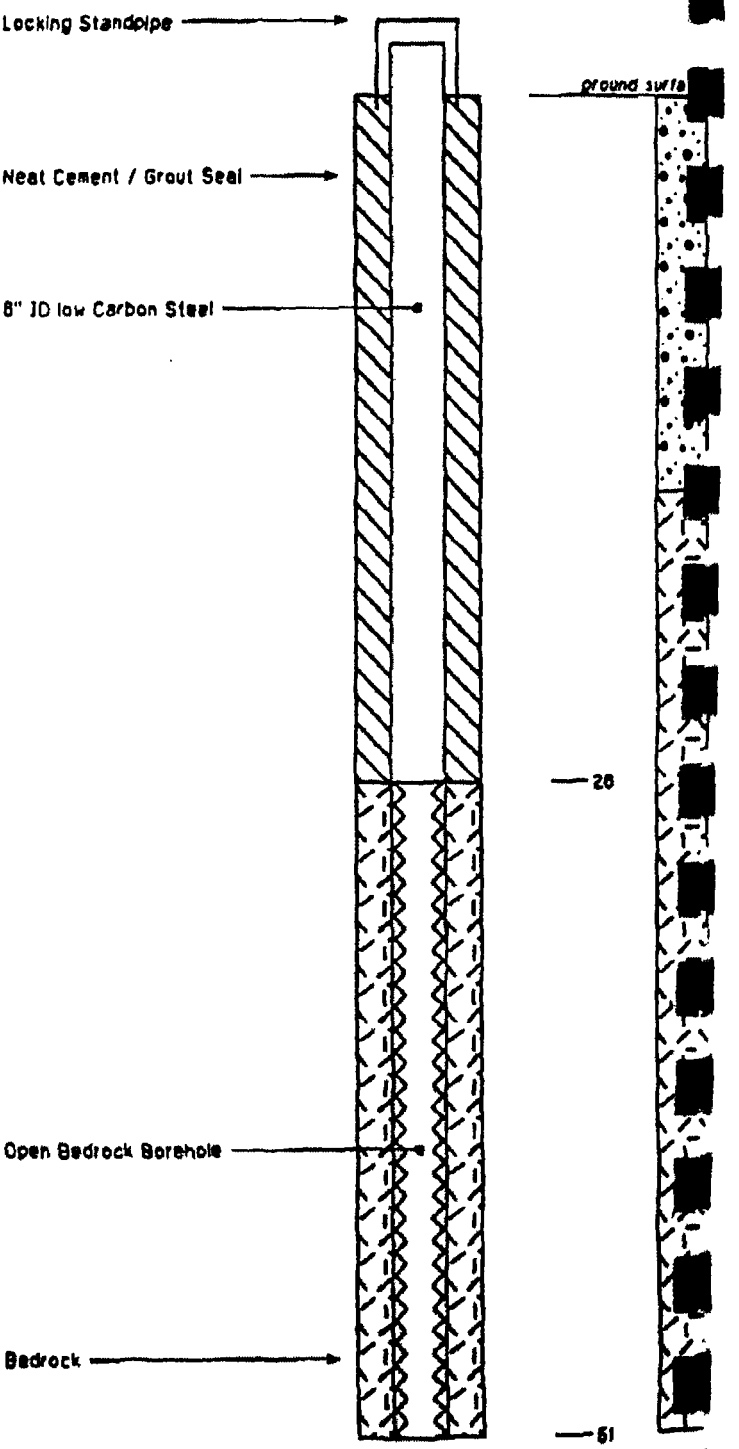
Fluid Loss During Drilling (gals) 500 est.
Water Removed During Development (gals)
1510 est. -

Static Depth to Water Date 6/5/96
Static Depth to Water (feet) 13.17

Well Purpose Bedrock recovery well

Remarks

Prepared By J. Hershberger
Date Prepared 6/19/96



GeoTrans, Inc.

GEOSYNTEC CONSULTANTS

LETTER OF TRANSMITTAL

To: M. Jasinski
New England Chief, NH/RI Superfund Section
US EPA New England (Region 1)
1 Congress Street Suite 1100 (HBO)
Boston, MA
USA 02114-2023

Date: September 02, 2005
From: S. O'Hara
Project & Task No.: TR0057.95

Via:	For:
☐ Messenger	☒ Approval
☐ Mail	☐ Your Use
☒ Courier	☐ As Requested
☐ E-Mail	☒ Review
☐ Facsimile	☐ For Comment
	☐ _____

Number of Copies	Drawing Number	Date	Description
2		September 01 2005	Final Interim Remedial Action Report

Remarks: _____

Copy to: _____
_____
File

From: _____
GeoSyntec Consultants

130 Research Lane, Suite 2
Guelph, Ontario, CANADA N1G 5G3
Phone: (519) 822-2230 • Fax: (519) 822-3151