Department of Environmental Conservation

Division of Environmental Remediation

Environmental Restoration
Record of Decision
Warren Court Site
Haverstraw, Rockland County, New York
Site Number B00203-3

March 2006

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* DENISE M. SHEEHAN, *Commissioner*

DECLARATION STATEMENT
ENVIRONMENTAL RESTORATION RECORD OF DECISION

Warren Court Environmental Restoration Site
Haverstraw, Rockland County, New York
Site No. B00203-2

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Warren Court site, an environmental restoration site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Warren Court environmental restoration site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Site Investigation/Remedial Alternatives Report (SI/RAR) for the Warren Court site and the criteria identified for evaluation of alternatives, the NYSDEC has selected capping with gas collection and treatment. The components of the remedy are as follows:

- A modified Part 360 cap will installed over the entire site.
- A gas collection and treatment system will be installed under the cap.
- The utility pipe bedding present on site will be sealed with bentonite.
- A drainage system will be installed along with new storm water catch basins.
- Environmental easements will be put in place to restrict future use to active recreational.

- A Site Management Plan (SMP) will be developed for the site.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective.

MAR 27 2006

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

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RECORD OF DECISION

Warren Court Site
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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the Warren Court site. The presence of contamination has created threats to human health and/or the environment that are addressed by this remedy.

The 1996 Clean Water/ Clean Air Bond Act provides funding to municipalities for the investigation and cleanup of brownfields. Under the Environmental Restoration (Brownfields) Program, the state provides grants to municipalities to reimburse up to 90 percent of eligible costs for site investigation and remediation activities. Once remediated the property can then be reused.

As more fully described in Sections 3 and 5 of this document, disposal of waste gypsum material has resulted in the generation of hydrogen sulfide. This hazardous substance has contaminated the groundwater and soil gas at the site, and has resulted in:

- A potential threat to human health associated with exposure to hydrogen sulfide gas.
- A potential threat to the environment associated with sulfate/sulfides in groundwater.

To eliminate or mitigate these threats, the NYSDEC has selected the following remedy to allow for active recreational use of the site:

- Installation of a cap across the entire site to prevent the release of hydrogen sulfide.
- Installation of a venting system under the cap with carbon treatment.
- Sealing of the existing utility pipe bedding material with bentonite plugs to prevent off-site migration of hydrogen sulfide.
- Installation of a drainage system to convey water away from the cap.
- Imposition of an environmental easement to restrict groundwater use and restrict future site use to active recreational.

- Development of a site management plan to address residual contamination and any use restrictions.

- Periodic certification of the cap and associated engineering controls.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Warren Court site is located in the Village of Haverstraw, Rockland County at the intersection of Anthony J. Morina, John P. Sullivan Court. The site is largely overgrown and partially covered by a paved road, which is in disrepair, as well as a number of house foundations which remain on the site. The site is currently vacant and surrounded by a chain link fence. The surrounding parcels are currently a combination of commercial, industrial, and residential uses with residential properties located immediately adjacent to the site.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

This site is a 3.5 acre former gypsum disposal site. During the late 1950s into the 1960s the site was filled with gypsum board waste. In the mid 1980s the site was subdivided and in the late 1980's single family housing was constructed on the gypsum disposal site. Due to hydrogen sulfide emissions from the buried gypsum, the homes were abandoned. The NYS Supreme Court issued a stipulation and consent order in 1995, reimbursing the property owners for their homes and releasing the Village from any liability. Subsequently, the homes were razed and the site was covered with soil. The site location is shown on Figure 1.

On July 29, 1999, the Village of Haverstraw acquired the property through tax foreclosure.

3.2: Remedial History

The Warren Court subdivision was constructed between 1987 and 1989. After construction and sale of the homes, residents became aware of odors in and around their properties. In January 1992 the Rockland County Department of Health (RCDOH) conducted a preliminary investigation and determined that the odors were related to hydrogen sulfide gas.

In April 1992, an Environmental Assessment revealed that the site had previously been used for disposal of gypsum wallboard and that the hydrogen sulfide gas was coming from these deposits of wallboard.

In July 1992, 26 boreholes were advanced around the site and four monitoring wells were installed. Findings indicated that the storm sewer system was the principal pathway for migration of hydrogen sulfide gas to the surface. By March of 1995, the onsite housing had been vacated and demolished. A remedial closure plan for mitigating hydrogen sulfide odors was implemented that included sealing and grouting of all sanitary and storm sewers and installation of a security fence around the site.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past owners and operators, waste generators, and haulers.

Since no viable PRPs have been identified, there are currently no ongoing enforcement actions. However, legal action may be initiated at a future date by the state to recover state response costs should PRPs be identified. The Village of Haverstraw will assist the state in its efforts by providing all information to the state that identifies PRPs. The Village of Haverstraw will also not enter into any agreement regarding response costs without the approval of the NYSDEC.

SECTION 5: SITE CONTAMINATION

The Village of Haverstraw has recently completed a site investigation/remedial alternatives report (SI/RAR) to determine the nature and extent of any contamination by hazardous substances at this environmental restoration site.

5.1: Summary of the Site Investigation

The purpose of the SI was to define the nature and extent of any contamination resulting from previous activities at the site. The SI was conducted between October 2004 and June 2005. The field activities and findings of the investigation are described in the SI report.

The following activities were conducted during the SI:

- Research of historical information;
- Installation of 24 bar probe samples and 17 monitoring wells for analysis of soil gas and groundwater as well as physical properties of soil and hydrogeologic conditions;
- Sampling of 18 new and existing monitoring wells;
- A survey of public and private water supply wells in the area around the site;
- Collection of one surface water sample;
- Cleaning and video survey of the existing storm drain system.

- Collection of head space soil gas field measurements were collected for methane and hydrogen sulfide in all monitoring wells.

- Preparation of a new topographic survey of the site was prepared.

To determine whether the groundwater and soil gas contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- 6 NYCRR Part 257, Subpart 257-10 which provides guidance for determination of when hydrogen sulfide gas becomes a nuisance in ambient air.

Based on the SI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the SI report.

5.1.1: Site Geology and Hydrogeology

The site is overlain with grass and topsoil to a depth of approximately 0.5 feet. A layer of construction fill is present from approximately 0.5 to 5.0 feet below ground surface (bgs). This fill layer has a fine-grained matrix similar to that of glacial till and is comprised of a mixture of till, cobbles and boulders, bricks, concrete and asphalt rubble, tree stumps and wood fragments. Gypsum fill is present from approximately 5 to 15 feet bgs. Generally, where gypsum was present in layers greater than 1 foot in thickness, it occurred as a discrete continuous layer. The fine -grained nature of the gypsum fill created a broad (2-4 ft.) capillary fringe above the water table where it occurred. Native soils/sediments were encountered at depths greater than 15 feet. Native soils/sediments encountered at depth in each of the borings include one or more of the following units: gray-to-tan, soft-to-stiff silty clay with interbedded layer of fine-medium sand and trace organic fibers; gray-to-black fine-medium sand and/or coarse silt with varying amounts of fine silt and clay with interbedded layers of both finer silt/clay and coarser sand/gravel; and gray, brown and black organic peat with a poorly sorted matrix of fine sand, silt and clay.

Groundwater elevations collected in June 2005 were significantly lower than levels taken in December 2004 and indicate groundwater movement in a northeasterly direction. Groundwater level measurements obtained in December 2004 were likely influenced by a water main break on the site, which has since been repaired. The gradient is relatively shallow and groundwater movement across the site is expected to be slow. The groundwater elevation data taken in June 2005 corresponds well with data obtained in 1994. Depth to groundwater ranges from 8 to 10 feet bgs.

5.1.2: Nature of Contamination

As described in the SI report, many soil gas and, groundwater samples were collected to characterize the nature and extent of contamination. Hydrogen sulfide is a colorless gas with a strong odor often associated with rotten eggs. If present at high enough levels hydrogen sulfide can be deadly. There are no SCGs for hydrogen sulfide in soil gas, however, soil gas samples have been compared to the ambient air standard of 0.01 ppm. The ambient air standard sets a level at which hydrogen sulfide presents a nuisance odor.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

Chemical concentrations are reported in parts per billion (ppb) for water, parts per million (ppm) for waste, soil, and sediment, and parts per million (ppm) for air samples. For comparison purposes, where applicable, SCGs are provided for each medium.

Table 1 summarizes the degree of contamination for the contaminants of concern and compares the data with the SCGs for the site. The following are the media that were investigated and a summary of the findings of the investigation.

Waste Materials

Boring logs show that drywall (gypsum) fill was found at eight of eleven locations. The depth to the drywall fill varied from approximately 10 feet on the west side of the site to 4 feet in the middle of the site. On average, drywall fill was encountered at approximately 6 feet bgs. Figure 2 shows the extent of gypsum waste.

Groundwater

Sulfides in groundwater were detected at three of eighteen locations; with concentrations ranging from 8.4 ppm to 480 ppm. Sulfides were also measured using photometric field equipment, however, all other samples analyzed with the field equipment were below 1 ppm, which is consistent with laboratory results. The SCG for sulfides is 50 ppb.

The concentration of sulfates was generally found to be consistent with the 1992 investigation results. In twelve of eighteen samples concentrations ranged from 39 ppm to 1300 ppm, with an average of approximately 600 ppm. Sulfates represent the dissolved drywall in the water and as such, are expected to closely show the location of the drywall fill. The highest concentration of sulfate in groundwater is close to the area of the most drywall fill and is, therefore, consistent with this expectation. Figure 3 shows the levels of sulfates in groundwater. The SCG for sulfate is 250 ppm.

Catch Basins

Sulfides and sulfate were detected in one catch basin at 823 ppm and 1.6 ppm respectively. However, following repair of a water main break, which occurred on the Warren Court site, infiltration of gypsum material into the catch basin ceased.

Soil Gas/ Ambient Air

Hydrogen sulfide readings were taken in the field using a Jerome 631-X Hydrogen Sulfide Analyzer (Jerome). Head space gas readings were collected from 11 groundwater probes, one monitoring well from a previous site investigation (MW-12), four catch basins, one test pit and 24 bar probe locations.

Results for hydrogen sulfide gas in the groundwater probes and monitoring well ranged from non-detect to greater than 50 ppm. Hydrogen sulfide gas was detected in the catch basins up to 26 ppm. One test pit was excavated under a foundation to determine whether or not the former houses were built on piles and during this work, hydrogen sulfide was detected at 0.004 ppm. Hydrogen sulfide was detected in the bar probes installed around the site perimeter up to 0.27 ppm. Hydrogen sulfide gas in ambient air is considered a nuisance at levels above 0.01 ppm.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the SI/RAR.

There were no IRMs performed at this site during the SI/RAR.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in the SI report.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Under the current land use at the site, construction workers and trespassers could be exposed to site contamination from soil gas moving into ambient air.

Depending on future land use at the site, future residents, recreational users, and construction workers could be exposed to contamination present in soil vapor that has moved into ambient air, if appropriate controls are not put in place.

Ingestion of contaminated groundwater is a potential exposure pathway. However, the area is served with public water therefore, exposure is not expected. In addition, the proposed remedy would place restrictions on groundwater use at the site.

5.4: Summary of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

Environmental receptors evaluated for potential risk of contamination from materials on the Warren Court site include Bowline Pond to the east, which is connected to the Hudson River, and the wetlands to the north. Given the low rate of movement of contaminants from the Warren Court site and the ongoing natural degradation processes, the amount of contaminants migrating toward these areas would be insignificant, and have no discernable impacts.

Site contamination has also impacted the groundwater resource in the immediate area of gypsum waste. Data supports that this contamination is generally confined to the site.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS AND THE PROPOSED USE OF THE SITE

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous substances disposed at the site through the proper application of scientific and engineering principles.

The proposed future use for the Warren Court Site is active recreational use (e.g. playing fields).

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to hydrogen sulfide in soil gas;
- exposures of persons at or around the site to sulfide in groundwater.

Further, the remediation goals for the site include attaining to the extent practicable:

- The SCG for ambient air quality of 14 $\mu g/m^3$ (0.01ppm) for hydrogen sulfide as outlined in 6 NYCRR Part 257, Subpart 257-10.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements. Potential remedial alternatives for the Warren Court Site were identified, screened and evaluated in the RA report which is available at the document repositories identified in Section 1.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the gypsum waste material and contaminated soil gas at the site.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2: Contaminant Removal and Off-Site Disposal

Present Worth: ..... *$ 5,625,000*
Capital Cost: ..... *$ 5,625,000*
Annual OM&M:
(Years 1-30): ..... *$ 0*

Under Alternative 2 gypsum waste material would be removed from the site and properly disposed of off-site. There is an estimated 11,000 cubic yards of gypsum waste at the Warren Court site located from approximately 6 to 15 feet below ground surface. Substantial quantities of gypsum are located below the water table. The waste gypsum is covered with layers of mixed fill material consisting of soil, rock, brick and concrete fragments. An estimated 25,000 cubic yards of fill would have to be removed to access the gypsum. Because the gypsum is entirely

saturated, dewatering of excavations and waste material would be necessary. During excavation, odor suppression and control technologies would be necessary to mitigate odor impacts to nearby residents. Once the gypsum deposits were removed it is expected that generation of hydrogen sulfide would cease or be so low as to be inconsequential. Excavation of the gypsum would take approximately six months.

Alternative 3: Capping with Gas Collection and Treatment

Present Worth: ..... *$ 2,715,000*
Capital Cost: ..... *$ 2,252,000*
Annual OM&M:
(Years 1-30): *$30,000*

Under Alternative 3 the entire site would be capped to prevent migration of hydrogen sulfide gas to the surface. The engineered cap system would consist of a gas venting layer; twelve inches of low permeability soil (10^{-5}); twelve inch barrier protection layer; and a top soil layer over the majority of the site. In select areas of the site, the cap would be modified to facilitate the erection of structures (e.g., concession stand) which would penetrate the cap. This membrane cap would consist of a gas venting layer; geomembrane liner; twenty four inch barrier protection layer, and a top soil layer (see Figure 5). The cap would include a gas collection and treatment system to collect hydrogen sulfide migrating from the gypsum. Existing utility pipes would be sealed with bentonite at key areas to prevent migration of hydrogen sulfide to off-site locations. A drainage system consisting of perimeter drains and new storm water catch basins would also be installed.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of environmental restoration projects in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the RA report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table #2.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the SI/RA reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the NYSDEC addressed the concerns raised.

No significant public comments were received.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the NYSDEC has selected Alternative 3, Capping with Gas Collection and Treatment as the remedy for this site. The elements of this remedy are described at the end of this section.

The selected remedy is based on the results of the SI and the evaluation of alternatives presented in the RAR.

Alternative 3 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by providing a barrier and collection system to address exposure from subsurface soil gas. Alternative 2 would also comply with the threshold selection criteria.

Because Alternatives 2 and 3 would satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternative 2 (excavation and offsite disposal) would have short-term impacts which can be difficult to control, such as odors associated with excavating the gypsum. Alternatives 2 and 3 (capping) both would have short-term impacts associated with increased traffic on local roads to deliver or remove fill material.

Achieving long-term effectiveness would be best accomplished by excavation and removal of the gypsum waste (Alternative 2). However, a properly installed and maintained cap would also provide acceptable long term effectiveness. Alternative 2 would be favorable because it would result in the removal of a large portion of the gypsum waste at the site.

Alternative 3 would be favorable in that it would be readily implementable. Alternative 2 would also be implementable, however, the excavation and removal of the gypsum waste would require extensive odor controls which may not be completely effective in suppressing the hydrogen sulfide odors. Also, a majority of the gypsum waste is located below the water table and would require dewatering prior to transfer off site.

Alternative 2, excavation and removal, would reduce the volume of waste on-site. Approximately 11,000 cubic yards of material would be removed with Alternative 2. The removal of the gypsum material would result in a significant decrease in hydrogen sulfide production. Alternative 3 would restrict the mobility of hydrogen sulfide gas by providing an effective barrier to human exposure via the cap and the gas collection and treatment system.

The cost of the alternatives varies significantly. Alternative 3 (capping) would be significantly less expensive than excavation Alternative 2 (excavation and offsite disposal).

The estimated present worth cost to implement the remedy is $ 2,715,000. The cost to construct the remedy is estimated to be $ 2,252,000 and the estimated average annual operation, maintenance, and monitoring costs for 30 years is $ 30,000.

The elements of the selected remedy are as follows:

1. A membrane barrier cap system will be used in areas where structures will penetrate the cap, as shown on Figure 4, consisting of (from top to bottom): 6-inches of soil capable of supporting a vegetated cover; 24 inches of barrier protection layer soil; a geocomposite

drainage net; 30 mil PVC geomembrane; and a six inch gas vent layer. Figure 5 shows the cap cross section.

2. A multilayer soil cap will be placed in all other areas of the site, as shown in Figure 4, consisting of (from top to bottom) 6-inches of soil capable of supporting a vegetated cover; 12 inches of barrier protection layer soil; a geocomposite drainage net; 12 inch low permeability (10^{-5}) soil layer; and a six inch gas vent layer.

3. A venting system consisting of 6-inches of sand gas vent layer will be installed over the entire site and vent trenches with perforated pipe, stone and sand, will be spaced at approximately 100 feet on center under the cap. Vent trenches will extend for the full depth from the gas vent layer to the top of existing grouted utility pipe bedding materials. Connecting piping and vent stacks with wind turbines will be installed for passive dispersion of vented gas.

4. A treatment system consisting of activated carbon canisters at two locations will provide treatment for any vented hydrogen sulfide to prevent dispersion of odors. Stacks and treatment modules will be installed in locked, fenced areas.

5. The existing utility pipe bedding material will be sealed with bentonite plugs to prevent any migration of gas to offsite locations.

6. A drainage system will be installed, consisting of perimeter ditches to convey collected water from the cap, and new storm water catch basins with associated piping.

7. Since the remedy results in gypsum waste remaining at the site an institutional control in form of an environmental easement will be required for the remedy. The environmental easement will:

   (a) Restrict the use of the site to active recreational uses, such as playgrounds, picnic areas, playing fields or other public uses with a reasonable potential for soil contact;

   (b) Restrict the use of groundwater on the site; and

   (c) Require management of the site in accordance with the provisions of the site management plan to be approved for the site by the NYSDEC.

8. A site management plan (SMP) will be developed and implemented. The SMP will identify the institutional controls and engineering controls (IC/ECs) required for the remedy and details their implementation. The SMP for this remedy will include:
   (a) An IC/EC control plan to establish the controls and procedures necessary to; (i) manage gypsum disposal material that may be excavated from the site during future activities, including procedures for soil characterization, handling, health

and safety of workers and the community as well as, disposal/reuse in accordance with applicable NYSDEC regulations and procedures, (ii) evaluate the potential for vapor intrusion for any buildings developed on the site, including mitigation of any impacts identified,(iii) maintain use restrictions regarding site development or groundwater use identified in the environmental easement; and (iv) require the property owner to provide an Institutional Control/ Engineering Control (IC/EC) certification, as required by regulations, on a periodic basis.

(b) A monitoring plan to monitor the groundwater; and

(c) An operation and maintenance plan to provide the detailed procedures necessary to operate and maintain the remedy, including the cap and gas treatment system.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the Warren Court environmental restoration process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

1. Repositories for documents pertaining to the site were established.

2. A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.

3. A fact sheet was sent out announcing the comment period and availability of the PRAP.

4. A public meeting was held on February 21, 2006 to present and receive comment on the PRAP.

5. A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

TABLE 1
Nature and Extent of Contamination

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppm)	SCG (ppm)	Frequency of Exceeding SCG
Monitoring Wells	Sulfate	ND - 1,300	250	12 of 18
	Sulfide	ND - 480	50	1 of 18
Catch Basins	Sulfate	823	250	1 of 1
	Sulfide	1.6	50	0 of 1

SOIL GAS	Contaminants of Concern	Concentration Range Detected (ppm)	SCG* (ppm)	Frequency of Exceeding SCG
Probe	Sulfide	ND - >50	0.01	26 of 42
Catch Basin or Manhole	Sulfide	ND - 26	0.01	15 of 18
Test Pit	Sulfide	0.004	0.01	0 of 2
Bar Probe	Sulfide	ND - 0.27	0.01	4 of 26

* 0.01 ppm is based on 6 NYCRR Part 257, Subpart 257-10 which provides guidance for determination of when hydrogen sulfide gas becomes a nuisance in ambient air.

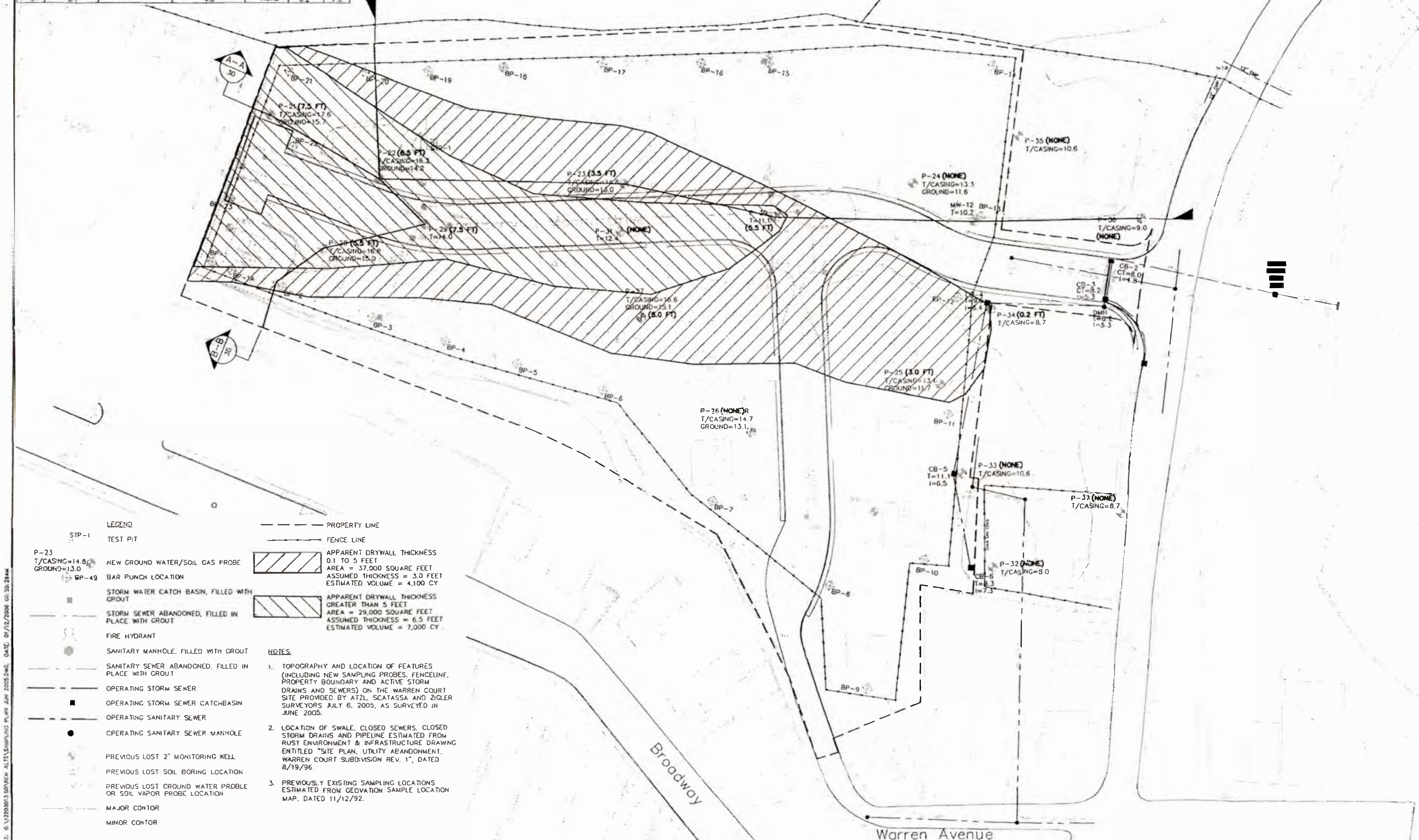
Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual OM&M	Total Present Worth
No Action	$0	$0	$0
Contaminant Removal and Off-Site Disposal	*$ 5,625,000*	*$ 0*	*$ 5,625,000*
Capping with Gas Collection and Treatment	*$ 2,252,000*	*$ 30,000*	*$ 2,715,000*

Warren Court
B00203-3

Site Location
Figure 1

PROBE SCHEDULE ELEVATIONS (AS INSTALLED)						
PROBE	GRADE EL.	GROUNDWATER ELEV. (NOV '04–DEC '04)	GROUNDWATER ELEV. (JUN '05)	TOP WALLBOARD	TOP OF SCREEN	DEPTH PROBE
P-21	15.7'	8.2'	7.1'	5.7'	10.7'	15'
P-22	14.2'	8.4'	7.7'	8.2'	11.2'	13'
P-23	13'	8.3'	5.3'	8'	10'	10'
P-24	11.6'	8.7'	5.0'	NONE	9.1'	8.5'
P-25	11.7'	7.8'	4.9'	8.7'	9.2'	8.5'
P-26	13.1'	10.2'	7.8'	NONE	9.6'	10.5'
P-27	15.1'	8.8'	6.4'	7.1'	12.1'	13'
P-28	15'	8.7'	7.4'	8'	12'	13'
P-29	14'	9.7'	7.1'	4'	11'	10'
P-30	11.1'	8.9'	5.3'	7.2'	8.7'	8.5'
P-31	12.4'	8.9'	5.4'	NONE	~10.5'	9.5'
MW-12	10.2'	9'	5.0'			14.2'
P-32	8.0		5.0'	NONE	2.5'	11.5'
P-33	10.6'		4.7'	NONE	5.1'	15.5'
P-34	8.7'		4.9'	4.5'	6.2'	9.5'
P-35	10.6'		4.6'	NONE	7.1'	9.5'
P-36	9.0'		4.4'	NONE	5.5'	9.5'
P-37	8.7'		4.8'	NONE	6.2'	7.5'



LEGEND

STP-1 — TEST PIT

P-23 T/CASING=14.8 GROUND=13.0 — NEW GROUND WATER/SOIL GAS PROBE

BP-49 — BAR PUNCH LOCATION

STORM WATER CATCH BASIN, FILLED WITH GROUT

STORM SEWER ABANDONED, FILLED IN PLACE WITH GROUT

FIRE HYDRANT

SANITARY MANHOLE, FILLED WITH GROUT

SANITARY SEWER ABANDONED, FILLED IN PLACE WITH GROUT

OPERATING STORM SEWER

OPERATING STORM SEWER CATCHBASIN

OPERATING SANITARY SEWER

OPERATING SANITARY SEWER MANHOLE

PREVIOUS LOST 2" MONITORING WELL

PREVIOUS LOST SOIL BORING LOCATION

PREVIOUS LOST GROUND WATER PROBLE OR SOIL VAPOR PROBE LOCATION

MAJOR CONTOR

MINOR CONTOR

PROPERTY LINE

FENCE LINE

APPARENT DRYWALL THICKNESS 0.1 TO 5 FEET
AREA = 37,000 SQUARE FEET
ASSUMED THICKNESS = 3.0 FEET
ESTIMATED VOLUME = 4,100 CY

APPARENT DRYWALL THICKNESS GREATER THAN 5 FEET
AREA = 29,000 SQUARE FEET
ASSUMED THICKNESS = 6.5 FEET
ESTIMATED VOLUME = 7,000 CY

NOTES:

1. TOPOGRAPHY AND LOCATION OF FEATURES (INCLUDING NEW SAMPLING PROBES, FENCELINE, PROPERTY BOUNDARY AND ACTIVE STORM DRAINS AND SEWERS) ON THE WARREN COURT SITE PROVIDED BY ATZL, SCATASSA AND ZIGLER SURVEYORS JULY 6, 2005, AS SURVEYED IN JUNE 2005.
2. LOCATION OF SWALE, CLOSED SEWERS, CLOSED STORM DRAINS AND PIPELINE ESTIMATED FROM RUST ENVIRONMENT & INFRASTRUCTURE DRAWING ENTITLED "SITE PLAN, UTILITY ABANDONMENT, WARREN COURT SUBDIVISION REV. 1", DATED 8/19/96.
3. PREVIOUSLY EXISTING SAMPLING LOCATIONS ESTIMATED FROM GEOVATION SAMPLE LOCATION MAP, DATED 11/12/92.

FILE: G:\13203013.00\NEW ALTS\SAMPLING PLAN JUN 2005.DWG, DATE: 01/12/2006 09:59:29AM

NO.	REVISION	DATE
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△		
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SHEET TITLE
DRYWALL LOCATION

PROJECT TITLE
BROWNFIELDS SITE INVESTIGATION WARREN COURT SUBDIVISION

CLIENT
VILLAGE OF HAVERSTRAW
40 NEW MAIN STREET
HAVERSTRAW, NY 10927

SCS ENGINEERS, PC
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
140 ROUTE 303, VALLEY COTTAGE, NEW YORK 10989
PH. (845) 353-5727 FAX. (845) 353-5731

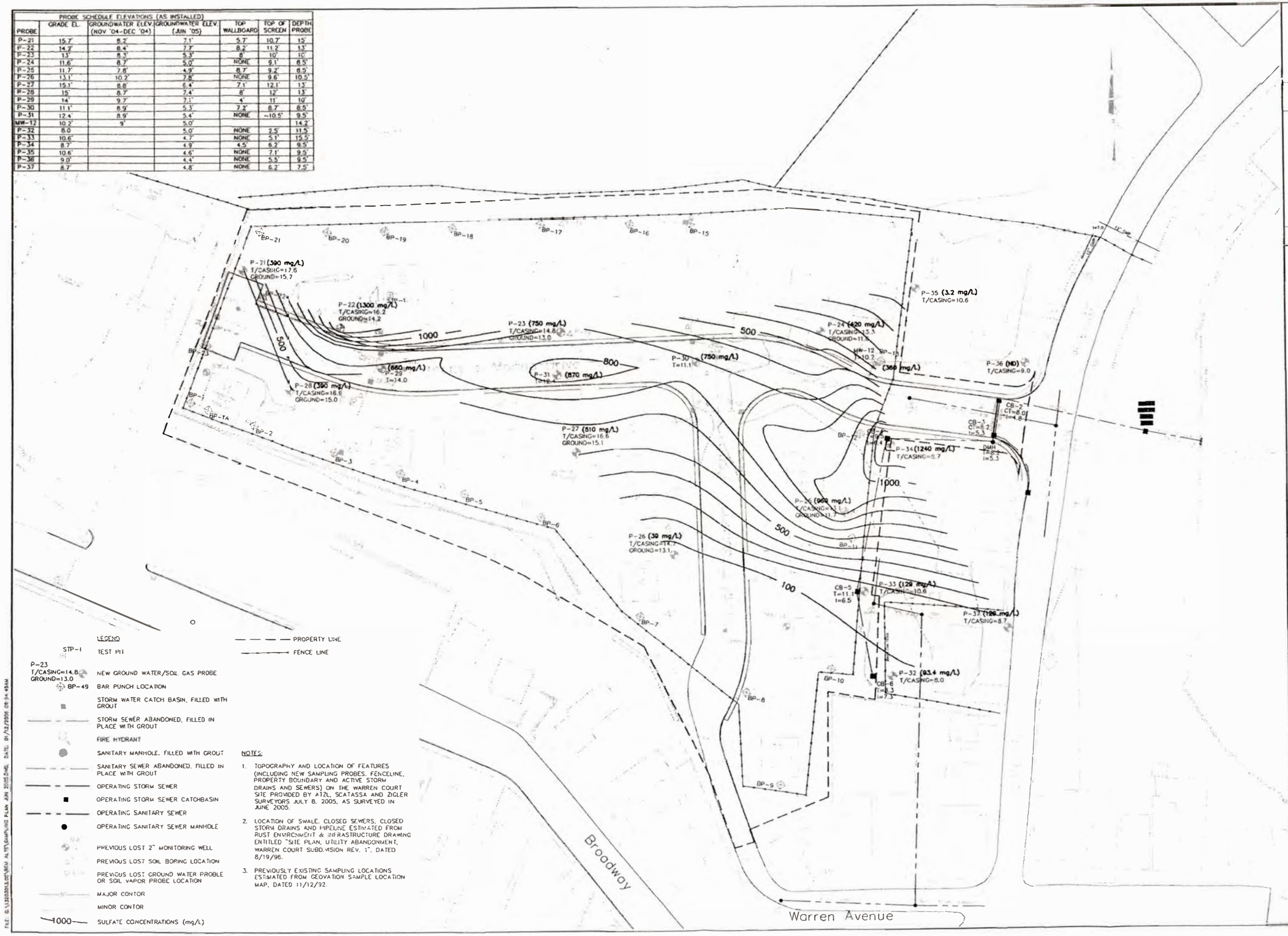
PROJ. NO. 13203013.00	DWN. BY: MMS	Q/A RVW BY: PFK
DSN. BY: MMS	CHK. BY: PFK	APP. BY: PFK

CADD FILE: sampling jun 05
DATE: 01/11/05
SCALE: 1"=30'

Figure 2

PROBE SCHEDULE ELEVATIONS (AS INSTALLED)

PROBE	GRADE EL.	GROUNDWATER ELEV. (NOV '04-DEC '04)	GROUNDWATER ELEV. (JAN '05)	TOP WALLBOARD	TOP OF SCREEN	DEPTH PROBE
P-21	15.7'	8.7'	7.1'	5.7'	10.7'	15'
P-22	14.2'	8.4'	7.7'	8.2'	11.2'	13'
P-23	13'	8.3'	5.3'	8'	10'	10'
P-24	11.6'	8.7'	5.0'	NONE	9.1'	8.5'
P-25	11.7'	7.8'	4.9'	8.7'	9.2'	8.5'
P-26	13.1'	10.2'	7.8'	NONE	9.6'	10.5'
P-27	15.1'	8.8'	6.4'	7.1'	12.1'	13'
P-28	15'	8.7'	7.4'	8'	12'	13'
P-29	14'	9.7'	7.1'	4'	11'	10'
P-30	11.1'	8.9'	5.3'	7.2'	8.7'	8.5'
P-31	12.4'	8.9'	5.4'	NONE	~10.5'	9.5'
MW-12	10.2'	9'	5.0'			14.2'
P-32	8.0		5.0'	NONE	2.5'	11.5'
P-33	10.6'		4.7'	NONE	5.1'	15.5'
P-34	8.7'		4.9'	4.5'	6.2'	9.5'
P-35	10.6'		4.6'	NONE	7.1'	9.5'
P-36	9.0'		4.4'	NONE	5.5'	9.5'
P-37	8.7'		4.8'	NONE	6.2'	7.5'



LEGEND

- STP-1 TEST PIT
- P-23 T/CASING=14.8 GROUND=13.0 NEW GROUND WATER/SOIL GAS PROBE
- BP-49 BAR PUNCH LOCATION
- STORM WATER CATCH BASIN, FILLED WITH GROUT
- STORM SEWER ABANDONED, FILLED IN PLACE WITH GROUT
- FIRE HYDRANT
- SANITARY MANHOLE, FILLED WITH GROUT
- SANITARY SEWER ABANDONED, FILLED IN PLACE WITH GROUT
- OPERATING STORM SEWER
- OPERATING STORM SEWER CATCHBASIN
- OPERATING SANITARY SEWER
- OPERATING SANITARY SEWER MANHOLE
- PREVIOUS LOST 2" MONITORING WELL
- PREVIOUS LOST SOIL BORING LOCATION
- PREVIOUS LOST GROUND WATER PROBLE OR SOIL VAPOR PROBE LOCATION
- MAJOR CONTOR
- MINOR CONTOR
- 1000 SULFATE CONCENTRATIONS (mg/L)
- PROPERTY LINE
- FENCE LINE

NOTES:

1. TOPOGRAPHY AND LOCATION OF FEATURES (INCLUDING NEW SAMPLING PROBES, FENCELINE, PROPERTY BOUNDARY AND ACTIVE STORM DRAINS AND SEWERS) ON THE WARREN COURT SITE PROVIDED BY ATZL, SCATASSA AND ZIGLER SURVEYORS JULY 8, 2005, AS SURVEYED IN JUNE 2005.
2. LOCATION OF SWALE, CLOSED SEWERS, CLOSED STORM DRAINS AND PIPELINE ESTIMATED FROM RUST ENVIRONMENT & INFRASTRUCTURE DRAWING ENTITLED "SITE PLAN, UTILITY ABANDONMENT, WARREN COURT SUBDIVISION REV. 1", DATED 8/19/96.
3. PREVIOUSLY EXISTING SAMPLING LOCATIONS ESTIMATED FROM GEOVATION SAMPLE LOCATION MAP, DATED 11/12/92.

NO.	REVISION	DATE

SHEET TITLE
SULFATE CONCENTRATIONS

PROJECT TITLE
BROWNFIELDS SITE INVESTIGATION
WARREN COURT SUBDIVISION

CLIENT
VILLAGE OF HAVERSTRAW
40 NEW MAIN STREET
HAVERSTRAW, NY 10927

SCS ENGINEERS, PC
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
140 ROUTE 303, VALLEY COTTAGE, NEW YORK 10989
PH: (845) 268-0137 FAX: (845) 268-0113

PROJ. NO. 13703.00 | DWN BY MMS | CHK. BY PFK | QA REVIEW PFK | APP. BY PFK | DSC. BY MMS

CADD FILE: Sampling jun 05

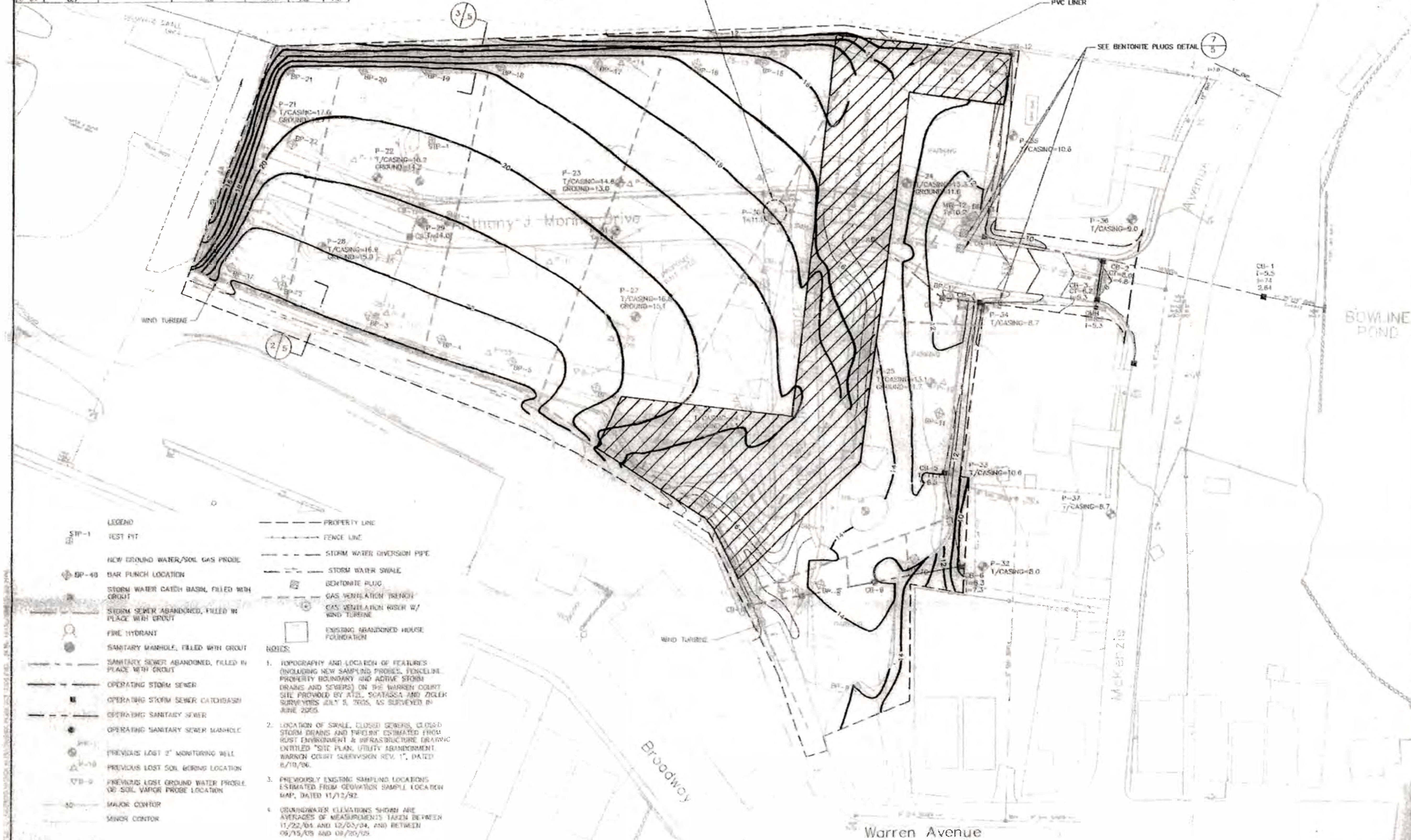
DATE: 12/27/05

SCALE: 1"=30'

Figure 3

FILE: G:\13703\FIGURES\NEW ALTS\SAMPLING PLAN JUN 2005.DWG, DATE: 01/12/2006 09:34:48AM

PROBE SCHEDULE ELEVATIONS (AS INSTALLED)						
PROBE	GRADE EL.	GROUNDWATER ELEV. (NOV '04–DEC '04)	GROUNDWATER ELEV. (JUN '05)	TOP WALLBOARD	TOP OF SCREEN	DEPTH PROBE
P-21	15.7'	8.2'	7.1'	5.7'	10.7'	15'
P-22	14.2'	8.4'	7.7'	8.7'	11.2'	13'
P-23	13'	8.3'	5.3'	8'	10'	10'
P-24	11.6'	8.7'	5.0'	NONE	9.1'	8.5'
P-25	11.7'	7.8'	4.9'	8.7'	9.2'	8.5'
P-26	13.1'	10.2'	7.8'	NONE	9.6'	10.5'
P-27	15.1'	8.8'	6.4'	7.1'	12.1'	13'
P-28	15'	8.7'	7.4'	8'	12'	13'
P-29	14'	9.7'	7.1'	4'	11'	10'
P-30	11.1'	8.9'	5.3'	7.2'	8.7'	8.5'
P-31	12.4'	8.9'	5.4'	NONE	~10.5'	9.5'
MW-12	10.2'	9'	5.0'			14.2'
P-32	8.6		5.0'	NONE	2.5'	11.5'
P-33	10.6'		4.7'	NONE	5.1'	15.5'
P-34	8.7'		4.8'	4.5'	6.2'	9.5'
P-35	10.6'		4.6'	NONE	7.1'	9.5'
P-36	9.0'		4.4'	NONE	5.5'	9.5'
P-37	8.7'		4.8'	NONE	6.2'	7.5'



NOTES:

1. TOPOGRAPHY AND LOCATION OF FEATURES (INCLUDING NEW SAMPLING PROBES, FENCELINE, PROPERTY BOUNDARY AND ACTIVE STORM DRAINS AND SEWERS) ON THE WARREN COURT SITE PROVIDED BY ATZL, SCATASSA AND ZIGLER SURVEYORS JULY 5, 2005, AS SURVEYED IN JUNE 2005.
2. LOCATION OF SWALE, CLOSED SEWERS, CLOSED STORM DRAINS AND PIPELINE ESTIMATED FROM RUST ENVIRONMENT & INFRASTRUCTURE DRAWING ENTITLED "SITE PLAN, UTILITY ABANDONMENT, WARREN COURT SUBDIVISION REV. 1", DATED 6/10/96.
3. PREVIOUSLY EXISTING SAMPLING LOCATIONS ESTIMATED FROM GEOVATION SAMPLE LOCATION MAP, DATED 11/12/92.
4. GROUNDWATER ELEVATIONS SHOWN ARE AVERAGES OF MEASUREMENTS TAKEN BETWEEN 11/22/04 AND 12/03/04, AND BETWEEN 06/15/05 AND 08/20/05.

NO.	REVISION	DATE

SHEET TITLE
TOP OF CAP GRADING PLAN

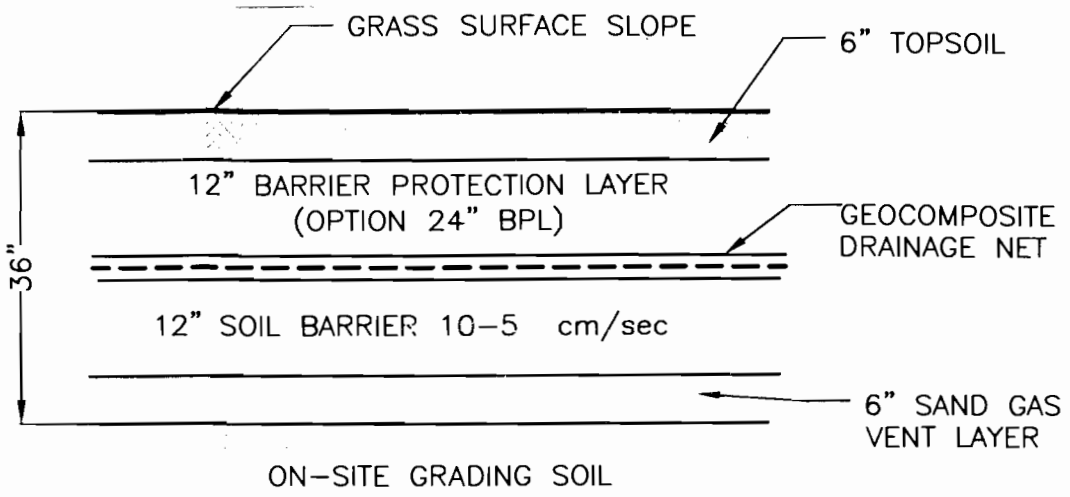
PROJECT TITLE
BROWNFIELDS REMEDIAL ACTION WARREN COURT SUBDIVISION

CLIENT
VILLAGE OF HAVERSTRAW
40 NEW MAIN STREET
HAVERSTRAW, NY 10927

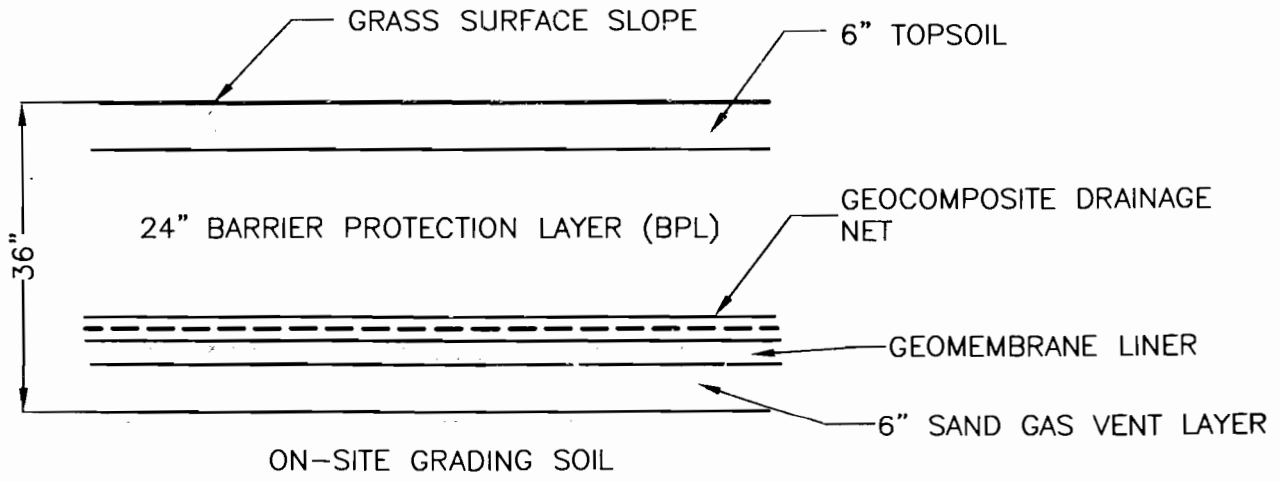
SCS ENGINEERS, PC
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.

CADD FILE: grading oct 05
DATE: 10/31/05
SCALE: 1"=30'

Figure 4



CAP "A" – SOIL CAP
CROSS SECTION
NTS



CAP "B" – MEMBRANE CAP
CROSS SECTION
NTS

Warren Court **Site #B00203**	**Soil Cap & Membrane Cap Cross Section** From: SCS Engineers, PC Warren Court SI/RAR, January 2006	**Figure 5**

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Warren Court Environmental Restoration Site
Haverstraw, Rockland County, New York
Site No. B00203-3

The Proposed Remedial Action Plan (PRAP) for the Warren Court site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on January 30, 2006. The PRAP outlined the remedial measure proposed for the generation of hydrogen sulfide at the Warren Court site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on February 21, 2006, which included a presentation of the Site Investigation (SI) and the Remedial Alternatives Report (RAR) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 16, 2006.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the NYSDEC's responses:

COMMENT 1: How will the uneven settling of the site be managed? How will future settling be avoided?

RESPONSE 1: The Village of Haverstraw has applied for, and has been granted, permission to implement a soil surcharge across the entire site. The purpose of the soil surcharge is to further stabilize the subsurface soils, prior to implementation of the remedy.

The soil surcharge will consist of the placement and grading of 6.25 feet of clean fill over the entire site. During the soil surcharge, the site will be covered with top soil and seeded. Settlement plates will also be installed across the site to monitor settlement. A settlement plate consists of a flat square piece of steel with a steel pipe welded perpendicular to the plate. The settlement plate is placed on the existing grade so that the pipe rises above the level of the clean fill placed during the soil surcharge. The top of the pipe rising above the clean fill can then be monitored for settlement. Placement of the soil surcharge is expected to begin in early 2006 and it is estimated that the soil surcharge will be left in place for a period of nine to twelve months.

COMMENT 2: Where will the vents be? Will the locations be planned so as to avoid conflict with future use?

RESPONSE 2: Vents are proposed to be located in the southeast and southwest corners of the site. During the remedial design the location of the vents will be finalized so as to minimize conflict with any future use of the site.

COMMENT 3: Where does the responsibility lie for monitoring the carbon filtration system? How long will the monitoring phase go on? How can people be sure it will not be neglected after some amount of time?

RESPONSE 3: At the completion of the remedial action a Site Management Plan (SMP) will be put in place which will detail the requirements for operation and maintenance of the remedy. As the current owner the Village of Haverstraw will be responsible for implementing the SMP, which will include periodic certification that the maintenance and monitoring outlined in the SMP has been conducted. Responsibility for implementing the SMP will be referenced by the Environmental Easement and will apply to all future owners of the property.

COMMENT 4: Is there offsite contamination?

RESPONSE 4: As shown in Figure 2, the location of drywall disposal on site has been well defined. However, the positive existence of drywall fill to the west of the site has not been confirmed. As a component of the Remedial Design this area will be investigated. Under the Environmental Restoration Program the Village of Haverstraw will be reimbursed at 100% for offsite investigation and remediation, if warranted.

COMMENT 5: Will the discharge from the vents create an odor?

RESPONSE 5: No. The vent system will be equipped with activated carbon filters which will be designed to remove any hydrogen sulfide present before venting to the atmosphere.

APPENDIX B

Administrative Record

Administrative Record

Warren Court
Site No. B00203-3

1. Proposed Remedial Action Plan for the Warren Court site, dated January 2006, prepared by the NYSDEC.

2. "Site Investigation/Remedial Alternative Report", January 12, 2006, prepared by SCS Engineers.