Superfund Proposed Plan

U.S. Environmental Protection Agency, Region II

Cortese Landfill Superfund Site
Sullivan County, New York

August 2010

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes source-control remedial alternatives considered for the Cortese Landfill Superfund site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing the Proposed Plan as part of its public participation responsibilities to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to the remedial alternatives under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §9617(a) and Section 300.430(f) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This Proposed Plan also proposes changes to the groundwater portion of the remedy selected by EPA for the site in a Record of Decision signed on September 30, 1994 (1994 ROD)[1]. All other aspects of the 1994 remedy have been implemented. In accordance with Section 117(a) of CERCLA and Section 300.435(c)(2)(i) of the NCP, if after the selection of a remedy in a ROD, a component is fundamentally altered, EPA must propose an amendment to the ROD. EPA's proposed changes to the ROD must first be made available for public comment in a Proposed Plan.

The alternatives summarized in the Proposed Plan are described in more detail in *Former Source Areas Feasibility Study Report, Cortese Landfill Site, Narrowsburg, New York*, Geosyntec Consultants, July 2010 report (2010 FS), which should be consulted for a more detailed description of all the alternatives.

This Proposed Plan is being provided as a supplement to the 2010 FS to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative and the proposed amendment to the groundwater portion of the 1994 ROD.

[1] A ROD is a document which formalizes the selection of the remedy at a Superfund site.

MARK YOUR CALENDAR

August 13, 2010 – September 12, 2010: Public comment period related to this Proposed Plan.

August 23, 2010 at 7:00 P.M.: Public meeting at the Tusten Town Hall, 210 Bridge Street, Tusten, New York.

The remedy described in this Proposed Plan is the *preferred* remedy for the site. A change from the preferred remedy selected in a ROD may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. The final decision regarding the changes to the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in the detailed analysis of the 2010 FS because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the 2010 FS report and this Proposed Plan have been made available to the public for a public comment period which begins on August 13, 2010 and concludes on September 12, 2010.

A public meeting will be held during the public comment period at the Tusten Municipal Building, 210 Bridge Street, Tusten, New York on August 23, 2010 at 7:00 P.M. to summarize the results of supplemental investigations that were undertaken and the evaluation of alternatives in the 2010 FS, to elaborate further on the reasons for recommending the preferred alternative and the proposed amendment to the groundwater portion of the 1994 ROD, and to receive public comments.

INFORMATION REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories:

Tusten-Cochecton Library
198 Bridge Street
Tusten, New York 12764
(845) 252-3360

Hours:

Monday, Wednesday, and Friday
11:30 A.M. - 4:30 P.M.
and
6:30 P.M. - 8:30 P.M.

Saturday
10 A.M. - 1 P.M.

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308

Hours: Monday - Friday, 9:00 A.M. - 5:00 P.M.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the ROD.

Written comments on the Proposed Plan should be addressed to:

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SCOPE AND ROLE OF ACTION

The primary objectives of this action are to remediate the source of groundwater contamination at the site, restore groundwater quality downgradient of the landfill, and minimize any potential future health and environmental impacts.

SITE BACKGROUND

Site Description

The site is located within the hamlet of Narrowsburg, New York. It is bound to the northeast by a steep bedrock escarpment and to the southwest by the CSX railroad embankment. The northern edge of the site lies approximately 70 feet south of the Narrowsburg Waste Water Treatment Plant. A small borrow pit (White's Pond) and a small backwater area (the embayment) along the eastern shoreline of the Delaware River are located about 800 feet southwest of the former landfill. The former landfill property boundary encompasses approximately 3.75 acres of land owned by the John Cortese Construction Corp. and another 1.53-acre parcel along the northern margin of the Cortese property owned by the Town of Tusten, which purchased the property from Mr. Cortese in 1973.

On the landfill side of the railroad embankment, areas to the southeast, east, and northeast of the former landfill are predominantly wooded and used for hunting. Areas on and south of the former landfill are seasonally flooded due to perched water conditions. In addition, there are several small wetland areas in the immediate area of the former landfill. An unpaved road between the landfill and the embankment is used by CSX employees for access to the railroad tracks.

Six residences are located on the 200-250 foot wide strip of land to the west of the former landfill between the embankment and the Delaware River. These properties are accessed by Delaware Drive, a paved road which dead ends toward the south at a cul-de-sac. The National Park Service classifies the Delaware River in the vicinity of the site as a Wild and Scenic River. The river in this area is used primarily for recreational boating and fishing. A site layout map is provided on Figure 1. All of the residences on Delaware Drive are served by publicly-supplied water.

The Narrowsburg public water supply is primarily supplied by a well (Town Well #3) located approximately one mile east of the former landfill. Two secondary wells in this system are located approximately 750 feet northwest and approximately one-half mile north-northwest of the former landfill (Town Well #1 and #2, respectively). Town Wells #1 and #2 are currently used to supplement the public water supply provided by Well #3. All three wells are hydraulically upgradient of the site, and are, thus, not affected by site-related contamination.

Site History

The landfill portion of the site, which was initially called the "Tusten Landfill," received municipal waste from approximately July 1970 to July 1981. Disposal practices at the landfill were poorly documented, hence, records regarding the types and volume of waste received are essentially nonexistent. For a six-month period in 1973, however, drummed industrial wastes were apparently brought to the site. These wastes apparently included drums containing paint thinners and sludge, solvents, dyes, waste oil, and petroleum products. Disposal is believed to have included the burial and/or emptying of drums in trenches and the emptying of tanker trucks into one of the two septage lagoons. The other lagoon was used strictly for the disposal of residential septage sludge. Subsequent groundwater monitoring revealed elevated concentrations of volatile and semi-volatile organic compounds.

In 1985, SCA voluntarily entered into a stipulation agreement with NYSDEC to conduct a remedial investigation (RI) at the site. The site was listed on CERCLA's National Priorities List in June 1986. A Phase I RI report was completed in July 1987, followed by a Phase II RI report which was completed in August 1988. In April 1990, NYSDEC formally transferred the lead role for the site to EPA. SCA entered into an Administrative Order on Consent (AOC) to complete an RI/FS with EPA in September 1990. A final RI report (March 1994), risk assessment (June 1994), and FS report (June 1994) were performed under the AOC. A ROD was issued on September 30, 1994, calling for, among other things, removal of drums and associated soils, capping the former landfill, groundwater extraction and treatment, institutional controls[2] and natural attenuation[3] of contaminants in downgradient areas.

Consent Decree negotiations between EPA and a group of twenty-eight potentially responsible parties (PRPs) to carry out the remedial design (RD) and construction of the selected remedy were successfully completed in September 1995; the Consent Decree was entered in U.S. District Court in May 1996.

From November 1995 through January 1996, concurrent with the initiation of the RD phase of the remediation, the Town of Tusten conducted a removal action (pursuant to a consent order with EPA) whereby contaminated soils from the two septage lagoons were excavated and disposed of off-site and a 1,200-foot storm-water diversion channel was constructed along the eastern perimeter of the landfill. The storm-water diversion channel diverts most of the storm water toward nearby wetlands, thereby reducing infiltration into the waste and, thus, leachate production from the former landfill.

The drum removal component of the selected remedy, which was performed in 1995 and 1996, resulted in the excavation and removal of more than 5,000 drums, three tractor trailer loads of hazardous sludge, and 50 dump trucks of contaminated soil from the landfill, and an additional 300 drums from an area adjacent to the septage lagoons, for off-site disposal. The design of the cap component of the selected remedy was completed in May 1997. Construction of the cap and restoration of wetlands was completed in 1998. Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. On-site institutional controls precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy, are expected to be in place in 2010.

In scoping out the design of the groundwater extraction and treatment system, it was determined that there were logistical problems associated with space constraints related to equipment and infrastructure sharing the same space as the landfill cap, waste-water treatment facility, and wetlands, as well as with difficulties related to transmitting the treated effluent either beneath the railroad embankment to the Delaware River or to groundwater. In response to these concerns, considerable efforts by the PRPs were devoted after cap completion to discern remedial approaches that would reduce the reliance on the full-scale groundwater extraction-and-treatment system contemplated in the 1994 ROD. These efforts have taken the form of investigations, studies, and bench- and field-scale pilot testing.

Early in this reassessment process, it became increasingly clear that there were additional, previously-unknown sources of volatile organic compound (VOC) contamination comprised of both chlorinated and non-chlorinated compounds beneath the former drum-disposal areas (a primary area beneath the landfill drum-disposal area and a small secondary drum-disposal area south of the landfill adjacent to the septage lagoons). The results of a 2001 shallow groundwater hot-spot investigation conducted along the downgradient perimeter of the landfill first indicated the potential presence of these source areas. A subsequent source-area investigation performed in 2004 clearly showed the

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2 Institutional controls are administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.

3 Natural attenuation is a variety of *in-situ* processes which, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

location of the primary previously-undocumented source area. Work to characterize the horizontal and vertical extent of this source area was conducted in 2007. Additional samples of soil, groundwater, and light non-aqueous phase liquid (LNAPL) were collected in February 2009 for the purpose of bench-scale treatability testing. All of these efforts have helped considerably in refining the conceptual site model.

Site Geology/Hydrogeology

The site lies on alluvial deposits within the Delaware River valley. These alluvial deposits are predominantly sand and gravel overlain by fine-grained floodplain deposits which cause perched groundwater conditions and surficial ponding of water in areas of poor drainage. Throughout the entire thickness of unconsolidated sediments, water occurs under water-table conditions. The saturated aquifer thickness is approximately 80 feet. Discontinuous lenses of fine-grained deposits occur locally in the sand and gravel, but the sequence of overburden sediments can be considered to be one unconfined hydrogeologic unit. Bedrock forms a second, deeper hydrogeologic unit. Bedrock escarpments rise approximately 400 feet above both sides of the river. Groundwater flows through fractures in the bedrock from these topographic highs to the topographic low (the river) through the overburden sediments. The Delaware River is, therefore, the discharge boundary for the valley. Groundwater flow in the overburden sediments in the site vicinity is predominantly horizontal to the southwest (*i.e.*, toward the river) at an overall average velocity throughout the entire saturated thickness of overburden of about 25 feet per year (maximum 75 feet per year).

The upper sand and gravel unit is a preferential pathway for groundwater flow from the former landfill to the Delaware River because it is located just below the water table and has a hydraulic conductivity seven times higher than the geometric mean for the entire aquifer as a whole, yielding a calculated flow velocity of 167 feet per year (500 feet per year maximum).

REMEDIAL INVESTIGATION SUMMARY

RI sampling of groundwater, surface and subsurface soil, surface water, sediment, and soil gas was conducted in three phases from 1987 to 1994 on and around the site. Since the subject of this Proposed Plan is related to the additional source areas located below the water table that were not detected during the original RI, and associated groundwater, only groundwater from the RI is discussed below. In addition, groundwater sampling has been conducted three times per year since the Fall of 1996. Vapor intrusion data, collected after the RI, is also discussed below. For information on the other media, please refer to the 1994 ROD or other documents available in the Administrative Record file.

Groundwater samples have been collected from up to twenty-six monitoring wells and Tusten Well #1 over the three phases of the RI and three times per year after the 1994 ROD. Data from samples collected at and downgradient of the former landfill revealed levels of VOCs, semi-volatile organic compounds (SVOCs), and metals exceeding the current Federal Safe Drinking Water Act and/or New York State Public Water Supplies Maximum Contaminant Levels (MCLs). The widest range of constituents and the highest concentrations were detected at monitoring wells S-1, S-2, EX-1, and MW-12 through MW-15, all of which are located in or near the landfill source area. The highest concentration of contaminants were detected at monitoring well S-2 (total chlorinated and non-chlorinated VOCs of 291,000 micrograms per liter [ug/l] and total SVOCs at 5,466 ug/l) during the April 2008 monitoring event.

Groundwater data indicate that the plume of site-related contaminants is approximately 1,300 feet wide. The former landfill is approximately 400 feet from the river. Groundwater impacts are found in shallow zones adjacent to the western edge of the landfill and in both shallow and deeper zones downgradient. From the landfill, the plume passes beneath the railroad embankment, Delaware Drive, and the previously-noted six residences and discharges to the Delaware River (see Figure 1). The majority of the contamination was detected in monitoring wells located within, or immediately adjacent to, the former landfill (*i.e.,* east of the railroad embankment). By comparison, levels in monitoring wells located within the plume area approximately 200 feet downgradient (west of the embankment) were generally one-tenth or less than those in the monitoring wells east of the embankment. Significantly lower contaminant levels in the downgradient wells indicate that natural attenuation and/or dilution affects the degree of contamination over relatively short distances. Analysis of natural-attenuation parameters in groundwater, performed as part of the long-term monitoring aspect of the 1994 ROD, has confirmed the strong presence of several natural attenuation indicators.

The vapor intrusion pathway[4] was also evaluated for several homes in the vicinity of the site. This effort was conducted from 2007 to 2009. The concentrations of the detected compounds were found to be below the levels of concern.

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[4] Vapor intrusion is a process by which VOCs move from a source below the ground surface (such as contaminated groundwater) into the indoor air of overlying or nearby buildings.

RESULTS OF THE SOURCE AREA INVESTIGATION

As noted above, after the 1994 ROD, a shallow groundwater hot-spot investigation along the downgradient perimeter of the former landfill was performed. This effort, conducted in 2001, served to further refine the site conceptual model for shallow groundwater migration pathways and was instrumental in refining the understanding of the lateral plume configuration and in beginning to understand the effect of the previously-unknown source areas on the plume. Data from a source area investigation performed in 2004 showed an area beneath the primary former drum-disposal area containing previously-undocumented sorbed-phase and residual-phase (*i.e.,* non-aqueous phase liquid [NAPL]) VOC contamination. Additional source characterization was conducted in 2007 to better evaluate the horizontal and vertical extent of this chlorinated- and non-chlorinated-VOC and petroleum-hydrocarbon source area and to provide data to support the selection and design of potential in-situ source-area treatment technologies. Additional samples of soil, groundwater, and LNAPL were collected in February 2009 for the purpose of in-situ chemical oxidation (ISCO) bench-scale treatability testing. Annual monitoring of the groundwater, conducted three times per year since 1996, has aided in the understanding of the effects on groundwater of the landfill source area as well as the small source area near the septage lagoons. These source areas are delineated on Figure 2.

The 1994 ROD estimated that with implementation of the groundwater component of the selected remedy (groundwater extraction and treatment at the landfill with downgradient natural attenuation), the cleanup goals would be met in approximately 14 years. With the confirmed presence of a large NAPL source area, the cleanup time-frame estimate for the groundwater remedy is now estimated at 150 years. For this reason, new remedial alternatives were assessed in the 2010 FS.

SUMMARY OF RISKS ATTRIBUTABLE TO GROUNDWATER

Current federal guidelines for acceptable site-related exposures are an individual incremental lifetime excess carcinogenic risk in the range of 10^{-4} to 10^{-6} (*e.g.,* the risk of an additional one-in-ten-thousand to one-in-a-million excess cancer risk) and a maximum health Hazard Index (which reflects noncarcinogenic effects for a human receptor) equal to 1.0. (A Hazard Index greater than 1.0 indicates a potential of noncarcinogenic health effects.)

The excavation and removal from the landfill of over 5,000 drums and the installation of the landfill cap have addressed non-groundwater-related risks. The potential site-related human health risks related to groundwater were identified in the 1994 ROD and have not substantially changed. The human health risk assessment, which is part of the 1994 RI/FS report and was discussed in the 1994 ROD, determined that hypothetical future use of the groundwater at the site would pose an unacceptable risk to human health. The hypothetical carcinogenic risk for exposure to groundwater by future residents was estimated to be 2×10^{-3}. This risk number means that 2 additional persons out of 1,000 would potentially be at risk of developing cancer if the site is not remediated and groundwater was to be used for potable purposes. The Hazard Index was estimated to be 140.

The vapor-intrusion pathway was evaluated and determined not to constitute a significant risk to human health or the environment.

With regard to ecological risk, any areas that may have posed such risks were addressed by the remedial actions that have already been taken at the site.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and site-specific risk-based levels.

The following remedial action objectives were established for the source areas and groundwater:

- reduce or eliminate the potential for source areas to release contaminants to groundwater;
- restore the aquifer downgradient of the landfill as a potential source of drinking water by reducing contaminant levels to the federal and state MCLs; and
- reduce or eliminate the potential for migration of contaminants downgradient of the former landfill.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, comply with ARARS, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains federal and state ARARs, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the source areas and the groundwater can be found in the 2010 FS report.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

The alternatives are:

Alternative 1: No Further Action

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no further action alternative does not include any physical remedial measures (beyond those remedial and removal actions already completed) that address any site-related media.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 2: Groundwater Near-Source Extraction and Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$4.1 million
Annual O&M Cost:	$611,000
Present-Worth Cost:	$11.7 million
Construction Time:	1 year

Under this alternative, five groundwater extraction wells would be installed in the upper sand and gravel unit near the source areas along the downgradient perimeter of the landfill, extending several feet into the underlying silt/sand layer. The conceptual treatment process for the groundwater would include metals precipitation, clarification/filtration, and air stripping. Treated groundwater would likely be discharged to the Delaware River via the existing Town of Tusten wastewater-treatment-facility outfall. The effectiveness of the treatment system would be assessed through long-term groundwater and surface-water monitoring. Monitoring is assumed to be conducted three times per year, and would include several surface water sampling stations west of the embankment, a network of groundwater wells, and any treated groundwater effluent discharge, all sampled for VOCs, SVOCs, metals, and municipal solid waste leachate indicator parameters.

The downgradient groundwater-contaminant plume would be addressed through MNA.

It is estimated that system construction would be completed in one year.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Alternative 3: In-Situ Source-Area Treatment and Downgradient Monitored Natural Attenuation

Capital Cost:	$5.2 million
Annual O&M Costs:	$419,000
Present-Worth Cost:	$8.1 million
Construction Time:	1 year

This alternative would employ a series of in-situ technologies to treat residual material within the source areas and to accelerate depletion of the source mass.

Initially, peroxide may need to be applied to help in adjusting subsurface conditions for air sparging. Air sparging/soil vapor extraction (SVE) would be used throughout the source areas to remove a significant component of the chlorinated and non-chlorinated VOCs and petroleum hydrocarbons by volatilization. Air sparging consists of injecting air below the water table in order to volatilize dissolved VOCs and partition them into soil gas above the water table. Air sparging also promotes aerobic degradation processes. The SVE wells would be utilized to collect the soil vapors. The collected vapors would be discharged to the atmosphere following aboveground treatment, if necessary. Any treatment residuals would have to be appropriately handled (*e.g.,* off-site treatment/disposal). The air sparge/SVE system would run until one or more performance measures (*e.g.,* diminished contaminant-removal efficiencies, *etc.*) are attained. It is estimated that this system would need to be run for seven years.

For the final phase of the air sparging/SVE, amendments such as ozone would be injected to aggressively destroy some of the remaining source materials.

At the conclusion of the air sparge/SVE and amendment- addition program, the groundwater would be allowed to stabilize for up to five years. This stabilization period is necessary to, among other things, allow for the active treatment components to subside and for the equilibration of the aqueous subsurface from aerobic to anaerobic conditions.

After this stabilization period, the groundwater would be treated using ISCO, if necessary, to address the remaining recalcitrant source materials. A surfactant application would be considered to flush stubborn sorbed source materials into the groundwater where an oxidant (such as persulfate) would be deployed to destroy the newly released contaminants.

Under this alternative, pilot-scale treatability testing would be used to determine the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data would be used in the system-design evaluation.

After the ISCO deployment, if determined to be necessary, MNA would be utilized as the final step to attain the cleanup objectives in the groundwater downgradient of the landfill.

The effectiveness of this alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in mass flux, *etc.*)[5].

It is estimated that construction related to this effort would be completed in one year.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely short-term effectiveness, long-term effectiveness and permanence, reduction of toxicity, mobility or volume, implementability, cost, compliance with applicable or relevant and appropriate requirements, overall protection of human health and the environment, and state and community acceptance. The evaluation criteria are described below.

- <u>Overall protection of human health and the environment</u> addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- <u>Compliance with applicable or relevant and appropriate requirements (ARARs)</u> addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- <u>Long-term effectiveness and permanence</u> refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

[5] Specific performance standards will be generated based on appropriate guidance, *e.g.*, EPA's 2004 guidance entitled *Performance Monitoring of MNA Remedies for VOCs in Ground Water.*

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance (O&M) costs, and net present worth costs.

- State acceptance indicates whether, based on its review of the 2010 FS report and Proposed Plan, the State concurs with, opposes, or has no comment on the selected remedy at the present time.

- Community acceptance will be assessed and refers to the public's general response to the alternatives described in the Proposed Plan and the 2010 FS report.

A comparative analysis of these alternatives based upon the evaluation criteria noted above follows.

Overall Protection of Human Health and the Environment

Alternative 1 would result in no active steps to address the source area or to restore groundwater quality to drinking-water standards in areas downgradient of the landfill and would therefore not be protective of human health and the environment. Alternatives 2 and 3 are active remedies that address source contamination and will restore groundwater quality downgradient of the landfill over the long term. Combined with institutional controls, Alternatives 2 and 3 would provide protectiveness of human health and the environment over both the short and long term.

Compliance with ARARs

EPA and NYSDOH have promulgated health-based protective MCLs (40 CFR Part 141, and 10 NYCRR, Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). The aquifer is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply. Although the groundwater downgradient of the landfill is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable or relevant and appropriate standard, because groundwater downgradient of the landfill is a potential source of drinking water.

Alternative 1 does not provide for direct remediation of the source area or the affected groundwater other than MNA and would, therefore, involve no further actions to achieve chemical-specific ARARs in a reasonable period of time. In contrast, Alternatives 2 and 3 would be more effective in reducing the source area and groundwater contaminant concentrations to a level below state and federal groundwater standards.

Emissions from the air stripper under Alternative 2 and the SVE wells under Alternative 3 would be required to comply with the substantive requirements of state and federal air-emission standards.

While both Alternatives 2 and 3 may potentially reach ARARs downgradient of the landfill sooner than Alternative 1, Alternative 3, with more aggressive source treatment, would likely attain ARARs more expeditiously than Alternative 2. A discharge-permit equivalency (*e.g.*, New York State Pollutant Discharge Elimination System or "SPDES") would be required for Alternative 2.

Other location-specific ARARs relevant to all of the alternatives include the Wild and Scenic Rivers Act (36 CFR Section 297.4), Executive Order 11990 (Protection of Wetlands), Executive Order 11988 (Floodplain Management), and the National Historic Preservation Act.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide reliable long-term effectiveness in a reasonable period of time.

Alternatives 2 and 3, which would both address the groundwater contamination with active engineered treatment systems, although by different means, would provide superior long-term effectiveness through removal of potential future contributions to downgradient groundwater contamination. There would be no long-term threat to human health or the environment as it is the intent of the preferred remedial action to restore the aquifer to drinking water standards in a reasonable period of time.

Alternative 2 would generate treatment residues which would have to be appropriately handled. Alternative 1 would not generate such residues.

Under Alternative 3, the configuration and number of air sparging/SVE wells, characterizing the extracted vapors, the application rates of the various reagents, and determining other operation and performance parameters would need to be determined based on the results of pilot-scale treatability testing. These data would be used in the system design evaluation. Under this alternative, the extracted vapors might need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (*e.g.,* off-site treatment/disposal).

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 would not actively reduce the toxicity, mobility, or volume of contaminants through treatment.

Alternatives 2 and 3 would reduce the toxicity, mobility, or volume of contaminants at the source area and in the downgradient groundwater through treatment, thereby satisfying CERCLA's preference for treatment.

Short-Term Effectiveness

Alternative 1 does not include any additional physical construction measures in any areas of contamination and, therefore, does not present a risk to site workers and the community as a result of their implementation. Alternatives 2 and 3 could potentially present adverse impacts to remediation workers, since these alternatives both would involve the installation of extraction wells, monitoring wells, and/or air sparge/vapor extraction wells through contaminated soils and groundwater. Difficulties related to space constraints and to the conveyance of treated water beneath the railroad embankment would need to be resolved for Alternative 2. Alternative 3 could pose adverse impacts to site workers since it would require the installation of significantly more wells and piping, but Alternative 2 could also pose adverse impacts to site workers because it requires treatment reagents and generates treatment residuals that would be handled by site workers. While both Alternatives 2 and 3 present some risk to on-site workers through dermal contact and inhalation of groundwater, treatment reagents/residuals, or soil vapor, these exposures can be minimized by utilizing proper protective equipment.

For Alternatives 2 and 3, the vehicle traffic associated with the construction could impact the local roadway system and nearby residents through increased noise level, as would the off-site transport of contaminated solids and delivery of potentially hazardous treatment reagents for Alternative 2. Under Alternatives 2 and 3, disturbance of the land during construction could affect the surface water hydrology of the site. There is a potential for increased stormwater runoff and erosion during excavation and construction activities that could be properly managed to prevent excessive water and sediment loading to adjacent wetlands.

Because no further actions would be performed under Alternative 1, there would be no implementation time. It is estimated that it would take 1 year to construct both Alternatives 2 and 3.

Based upon estimated time frames for the source areas in contact with groundwater to be depleted, Alternative 2 would achieve cleanup goals in approximately 150 years. Alternative 3 would achieve cleanup goals in approximately 15 years.

Implementability

Alternative 1 would be the easiest to implement, as there would be no new activities to undertake.

All treatment equipment that would be used in Alternatives 2 and 3 are proven and commercially available. Difficulties related to space constraints and to the conveyance of treated water beneath the railroad embankment would require to be resolved for Alternative 2. Transportation and disposal of treatment residues could be easily implemented using commercially-available equipment. Under these alternatives, sampling for treatment effectiveness and groundwater monitoring would be necessary, but could be easily implemented.

Cost

The present-worth costs for Alternatives 1 through 3 are calculated using a discount rate of 7 percent; a 30-year time interval was used for Alternatives 1 and 2, and a 15-year time interval for Alternative 3. The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the table below.

Alternative	Capital Cost	Annual O&M Cost	Total Present-Worth Cost
1	$0	$0	$0
2	$4.1 million	$611,000	$11.7 million
3	$5.2 million	$419,000	$8.1 million

As can be seen by the cost estimates, Alternative 1 is the least costly remedy at $0. Alternative 2 is the most costly remedy with a present-worth cost of $11.7 million. The present-worth cost for Alternative 3 is $8.1 million.

State Acceptance

NYSDEC concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be assessed following review of the public comments received on the various reports and the Proposed Plan. A responsiveness summary will be prepared to address significant comments received during the public comment period.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and NYSDEC recommend Alternative 3 as the preferred alternative to address the source areas and contaminated groundwater. Specifically, this would involve the following:

- Air sparging/SVE of the source areas for approximately seven years to remove a significant component of the petroleum hydrocarbons and other VOCs. SVE wells would be installed to collect the soil vapors and discharge them to the atmosphere after above-ground treatment, if necessary.

- Amendment additions, such as ozone, to the air sparging/SVE for the final phase of the air sparge/SVE period.

- Stabilization of the subsurface for up to five years after active groundwater sparging has been completed.

- Application of ISCO, if necessary, potentially including a surfactant enhancement, to address the remaining more recalcitrant source materials.

- MNA.

- Long-term monitoring.

Pilot-scale treatability testing would be used to determine the configuration and number of air sparging/SVE wells, the characterization of the extracted vapors, the application rates of the various reagents, and any other operation-and-performance parameters. These data would be used in the system-design evaluation. In addition, the extracted vapors may need to be treated before being vented to the atmosphere. Any treatment residuals would have to be appropriately handled (*e.g.,* off-site treatment/disposal).

The effectiveness of the preferred alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in mass flux, *etc.*).

After the preferred alternative is in place, it is estimated that groundwater in the aquifer downgradient of the landfill would meet the remediation goals in approximately 15 years.

The environmental benefits of the preferred alternative may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green policy[6]. This will include consideration of green remediation technologies and practices.

EPA may invoke a technical waiver of groundwater ARARs if the remediation program indicates that reaching MCLs in the aquifer is technically impracticable from an engineering perspective.

Institutional controls for areas downgradient of the landfill, finalized in 1998, preclude any potable use of groundwater and require all new construction to have water provided by the public supply. On-site institutional controls precluding, among other things, potable use of groundwater and activities that would interfere with the protectiveness of the selected remedy, are expected to be in place in late 2010. The institutional controls already in place for areas downgradient of the landfill, as well as those expected to be in place in late 2010 for the former landfill property, would be verified as remaining in effect periodically as part of the long-term monitoring effort.

Because this alternative would result in contaminants remaining on-site which exceed acceptable health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, additional response actions may be implemented.

Basis for the Remedy Preference

Both Alternatives 2 and 3 are moderately difficult to implement and are energy intensive. Alternative 2 is more difficult to implement in terms of installation and operation of the groundwater treatment process while Alternative 3 is more complex during well installation. While the capital costs of these two alternatives are comparable, operation and maintenance costs are significantly lower for Alternative 3 and it has the potential to achieve cleanup goals in a much shorter period of time (150 years for Alternative 2 versus 15 years for Alternative 3). Therefore, EPA believes that

[6] See http://epa.gov/region2/superfund/green_remediation.

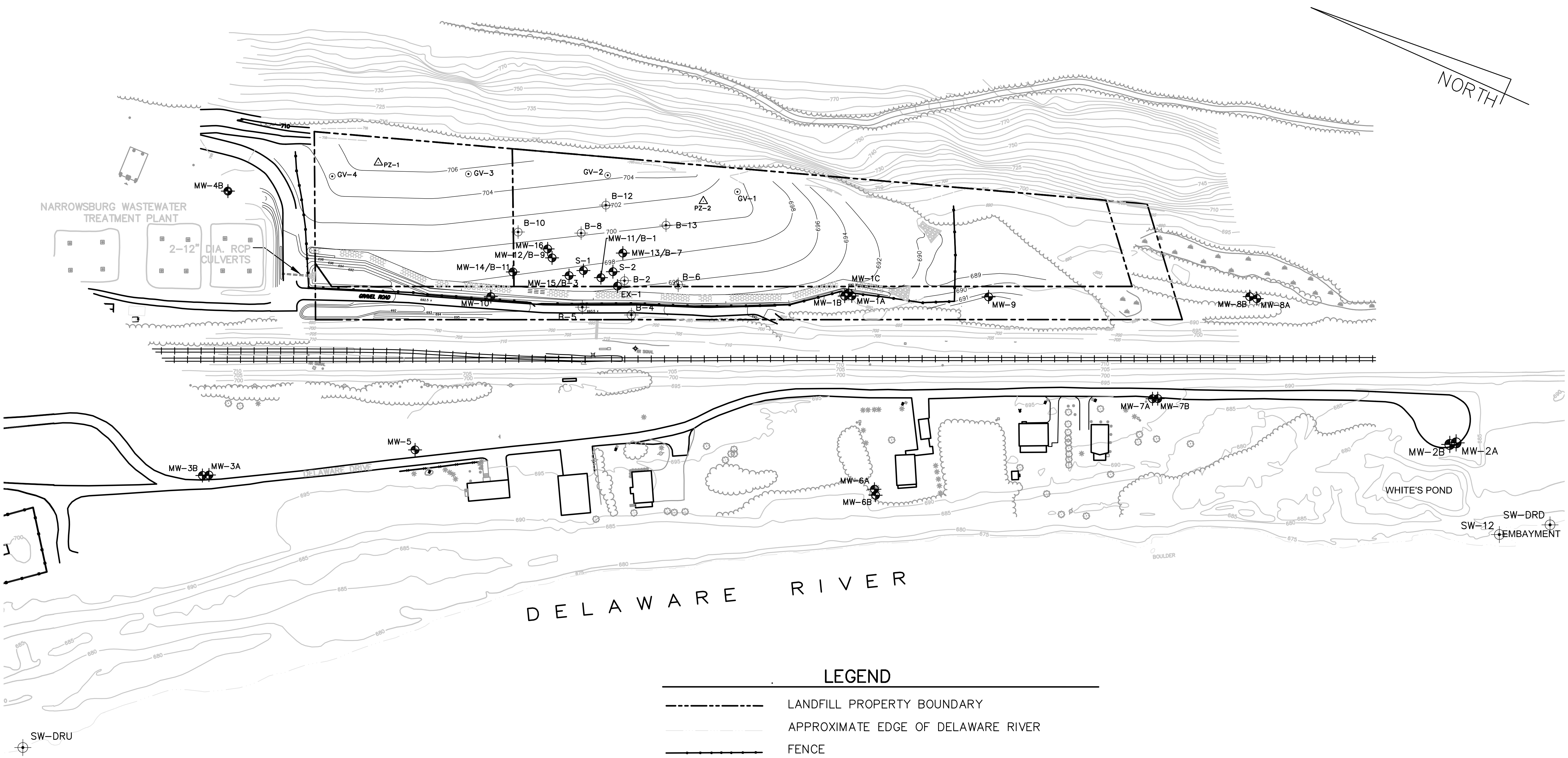
Alternative 3 would effectuate the groundwater cleanup while providing the best balance of tradeoffs with respect to the evaluating criteria.

The preferred alternative is believed to provide the greatest protection of human health and the environment, provide the greatest long-term effectiveness, be able to achieve the ARARs more quickly, or as quickly, as the other alternatives, and is cost-effective. Therefore, the preferred alternative would provide the best balance of tradeoffs among alternatives with respect to the evaluation criteria. EPA and NYSDEC believe that the preferred alternative would be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions, alternative treatment technologies, and resource-recovery technologies to the maximum extent practicable. Because treatment of the VOC-contaminated soils is being performed, the preferred alternative also meets the statutory preference for the use of treatment as a principal element.

PROPOSED AMENDMENT TO THE 1994 ROD

As noted above, this Proposed Plan proposes changes to the groundwater portion of the remedy selected by EPA in the 1994 ROD. As is discussed above, subsurface soil and groundwater data collected after the 1994 ROD indicate a substantial modification of the conceptual site model. Specifically, this data identifies the presence of a large, previously-unknown NAPL source area beneath the former drum trenches. The 1994 ROD estimated that with implementation of the groundwater remedy (groundwater extraction and treatment at the landfill with downgradient MNA), the cleanup goals would be met in approximately 14 years. With the confirmed presence of this large NAPL source area, the cleanup time-frame estimate for the 1994 ROD's groundwater remedy is now estimated at 150 years. For this reason, new remedial alternatives were assessed in the 2010 FS. Based upon the results of the 2010 FS and considering the preferred alternative in this Proposed Plan which directly addresses the source areas, the groundwater portion of the 1994 ROD (groundwater extraction and treatment at the landfill with downgradient MNA) is proposed to be amended.

As noted above, the effectiveness of the preferred alternative would be determined based upon the attainment of specific performance standards and cleanup goals for each step in the treatment process (*e.g.,* attainment of MNA performance monitoring standards, reduction in mass flux, *etc.*). Should the preferred alternative fail to attain these standards and goals or should its implementation prove impracticable, then "Groundwater Extraction and Treatment and Downgradient MNA" (Alternative 2), which is also the groundwater remedy selected in the 1994 ROD, would at that time be evaluated as the contingency remedy.



LEGEND

(dash-dot line)	LANDFILL PROPERTY BOUNDARY
(light line)	APPROXIMATE EDGE OF DELAWARE RIVER
(line with dots)	FENCE
704	LANDFILL COVER ELEVATION CONTOUR
780	PRE-EXISTING TOPOGRAPHY ELEVATION CONTOUR
GV-1	PASSIVE GAS VENT
MW-10	MONITORING WELL
SW-DRU	SURFACE WATER SAMPLE POINT
PZ-1	PIEZOMETER

150 75 0 150

SCALE: 1" = 150'

NOTES

1.) ALL COORDINATES SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN DATUM 1983 (NAD 83) AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF N 05°05'25" AND E A DISTANCE OF 426,246.03' AS APPLIED TO THE NATIONAL GEODETIC SURVEY DATUM OF 1927 (NAD 27). ALL ELEVATIONS SHOWN ON THIS MAP REFLECT THE NORTH AMERICAN VERTICAL DATUM OF 1988, AS DERIVED USING THE NATIONAL GEODETIC SURVEY SHIFT OF −0.5479' AS APPLIED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

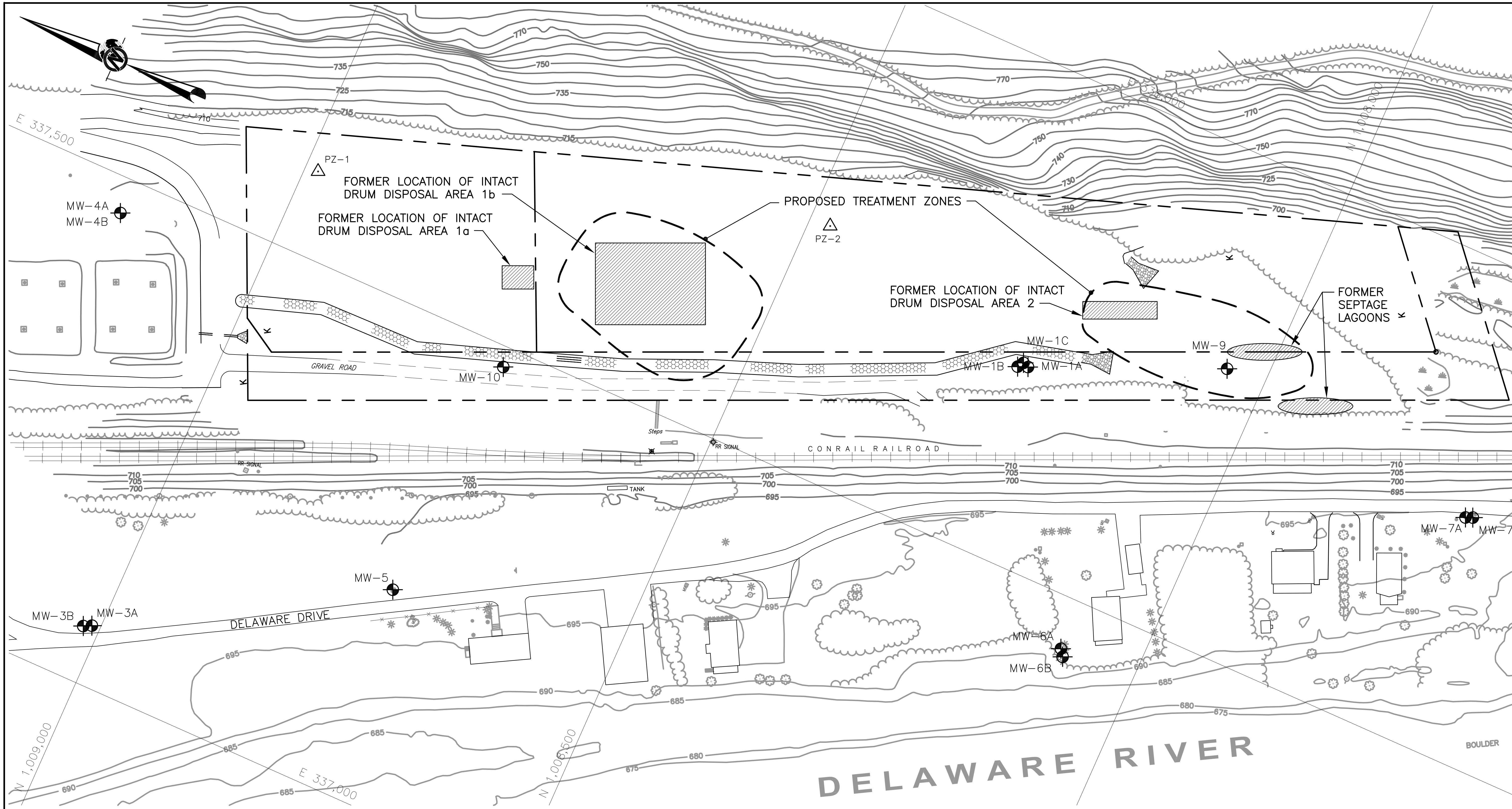
2.) TOPOGRAPHY AND SURFACE FEATURES EAST OF DELAWARE DRIVE WERE ORIGINALLY PREPARED BY FIELD METHODS BY OM P. POPLI P.E., L.S. P.C. CONSULTING ENGINEERS & SURVEYORS, ROCHESTER, NEW YORK, MARCH 1995. TOPOGRAPHY CHANGES SINCE MARCH 1995 PREPARED BY ENVIRONMENTAL RESEARCH, INC. ON DECEMBER 12, 1996. PROPERTY LINES EAST OF DELAWARE DRIVE WERE DETERMINED FROM A SURVEY MAP ENTITLED "CORTESE LAND FILL SITE" DATED MAY 7, 1985, PREPARED BY GARY PACKER, P.L.S. AND "TAX MAP, TOWN OF TUSTEN, SULLIVAN COUNTY, NY," DATED 11/20/92. LANDFILL PROPERTY BOUNDARY TAKEN FROM BASELINE-PROPERTY BOUNDARY-CONTROL, CORTESE LANDFILL SITE, TOWN OF TUSTEN, SULLIVAN COUNTY, NY, MAY 7, 1985, BY GARY PARKER, P.L.S. TOPOGRAPHY AND SURFACE FEATURES WEST OF DELAWARE DRIVE WERE DIGITIZED FROM AN ELECTRONICALLY SCANNED FILE OF THE TOPOGRAPHIC BASE MAP PREPARED BY ROBINSON AERIAL SURVEYS, INC., BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPH TAKEN APRIL 18, 1985.

3.) REFERENCE: DRAWING DEVELOPED FROM FIGURE 2, "SITE PLAN" OF THE SOURCE CHARACTERIZATION REPORT BY GOLDER ASSOCIATES, INC., DATED 24 JANUARY 2008.

SITE PLAN
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	AUGUST 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f351
FIGURE NO.	1



LEGEND

- LANDFILL PROPERTY BOUNDARY
- 750 TOPOGRAPHIC CONTOUR
- MW-10 MONITORING WELL
- PZ-1 PIEZOMETER

SCALE: 100 0 100 FEET

NOTES

REFERENCE: FIGURE DEVELOPED FROM FIGURE 4A OF THE SHALLOW GROUNDWATER HOT SPOT INVESTIGATION, REMEDIAL WORK ELEMENT II, CORTESE LANDFILL SITE, NARROWSBURG, NEW YORK (GOLDER ASSOCIATES, INC.; 2001).

FORMER SOURCE AREAS
CORTESE LANDFILL SITE
NARROWSBURG, NEW YORK

Geosyntec consultants

COLUMBIA, MARYLAND

DATE:	AUGUST 2010
PROJECT NO.	MR0562
DOCUMENT NO.	MD10172
FILE NO.	0562f352
FIGURE NO.	2