Peninsula Boulevard Groundwater Contamination Superfund site Nassau County, New York

July 2011

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the contaminated groundwater at the Peninsula Boulevard Groundwater Contamination Superfund site and identifies the preferred remedy with the rationale for this preference. This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the New York State Department of Environmental Conservation (NYSDEC). EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The nature and extent of the contamination at the site and the remedial alternatives summarized in this Proposed Plan are described in the June 2011 Remedial Investigation (RI) Report and Feasibility Study (FS) Report, respectively. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted.

This Proposed Plan is being provided as a supplement to the above-noted documents to inform the public of EPA and NYSDEC's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative. EPA and NYSDEC's preferred alternative involves the extraction and on-site treatment of contaminated groundwater. The treated groundwater effluent would be disposed by discharge to a waste-water treatment plant, surface water or reinjection to groundwater.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred alternative or a change from the preferred alternative to another alternative may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding 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 Proposed Plan and in the detailed analysis section of the FS report, since EPA and NYSDEC may select a remedy other than the preferred alternative.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
July 28, 2011 – August 27, 2011
EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: August 3, 2011 at 7:00 pm
EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the Village of Hewlett High School, 60 Everit Avenue, Hewlett, NY.

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 RI and FS reports and this Proposed Plan have been made available to the public for a public comment period which begins on July 28, 2011 and concludes on August 27, 2011.

A public meeting will be held during the public comment period at the Hewlett High School on August 3, 2011 at 7:00 p.m. to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred alternative, and to receive public comments.

INFORMATION REPOSITORIES

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

Hewlett-Woodmere Public Library
1125 Broadway
Hewlett, New York 11557-0903
Telephone: (516) 374-1967
Hours of operation:
Mon-Thurs 9 am – 9 pm
Fri 9-6, Sat 9 am – 5 pm, Sun 12:30 pm – 5 pm

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

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

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 groundwater contamination, to minimize the migration of contaminants, and to minimize any potential future health and environmental impacts. This Proposed Plan addresses groundwater contamination, designated Operable Unit 1 (OU 1) at the site. EPA is currently conducting an RI to identify and delineate the potential source(s) of the tetrachloroethylene (PCE) contamination, designated Operable Unit 2 (OU 2). A final remedy to address the source contamination will be presented in a future Proposed Plan and Record of Decision.

SITE BACKGROUND

Site Description

The Peninsula Boulevard Groundwater Plume Superfund Site (the Site) consists of the area within and around a groundwater plume located in the Village of Hewlett, Town of Hempstead, Nassau County, New York. John F. Kennedy International Airport is located approximately three miles to the west of the Site. A Site location map is provided as Figure 1.

The area consists of a mix of commercial and residential properties, with the majority of the commercial properties being located along Mill Road, Peninsula Boulevard, Broadway, and West Broadway. Woodmere Middle School is located along the western site boundary. Portions of Motts Creek, Doxey Brook Drain, and an unnamed tributary leading to Motts Creek are located within the Site.

The residences in the area of the Site are serviced by the Long Island American Water Company (LIAWC). The LIAWC operates a well field approximately 1000 feet north of the Site. The water delivered to these residents is a blend of water from several well fields. Since 1991, LIAWC has been treating groundwater pumped from this well field with an air stripper prior to distribution. Based on a records review of water supply wells in the area, private wells are not utilized for drinking water in the area.

Site History

A series of investigations and removal actions from 1991 to 1999 on behalf of the owner of the former Grove Cleaners and the NYSDEC revealed an extensive groundwater contaminant plume extending both to the north and south of Peninsula Boulevard, primarily consisting of the chlorinated volatile organic compound (CVOC) PCE.

The investigation revealed that operations at the former Grove Cleaners, located at 1274 Peninsula Boulevard, from 1987 to 1992 resulted in the disposal of hazardous wastes, including the volatile organic compounds (VOCs) PCE and trichloroethylene (TCE) to the environment. In March 1991, the Nassau County Department of Health (NCDH) cited Grove Cleaners for discharging hazardous waste into on-site dry wells. PCE was detected in soil and sludge samples collected at the Grove Cleaners site, and in other media at and near the property. The results of the investigation suggested the potential for additional source areas other than the former Grove Cleaners site. Following the implementation of interim remedial measures, which consisted of the removal of impacted soils related to solvent discharge to a dry well, a No Further Action remedy was selected by NYSDEC in March 2003 for the former Grove Cleaners site.

On March 7, 2004, EPA proposed inclusion of the Site on the National Priorities List (NPL) and on July 22, 2004, EPA placed the Site on the NPL.

EPA conducted an RI at the Site from 2005 through 2010. Environmental sampling of groundwater, surface water, soil and sediment was performed and a Data Evaluation Report (DER) presenting the results of the environmental sampling was prepared in October 2008. Supplemental RI work was conducted at the Site in 2010 to address data gaps including hydrogeological sampling and analyses, and to develop a baseline human health risk assessment (HHRA) and screening-level ecological risk assessment (SLERA). A DER Addendum was issued in December 2010 presenting the results of this sampling. A RI Report was released in June 2011.

The RI identified groundwater contaminated with PCE, PCE breakdown products and low levels of other VOCs.

The source of the PCE groundwater contamination has not yet been identified.

Site Hydrogeology

The Upper Glacial Aquifer (UGA) underlies the Site. Groundwater flow in the UGA is dominated by a groundwater divide located approximately 2000 feet south of Peninsula Boulevard, along a low ridge trending southwest to northeast. North of the divide, groundwater flow is both north and west, depending upon depth. South of the divide, groundwater flow within the UGA southward toward Macy Channel.

North of the Site, the UGA overlies the Jameco Aquifer. In this area of Long Island, the Jameco Aquifer is limited in extent, but is an important water-bearing zone because of its high hydraulic conductivity on the order of 200 feet per day. The LIAWC Plant #5 Well Field adjacent to the Site utilizes the Jameco as its source aquifer and does not utilize the UGA for water production. Given the similar hydraulic properties of the UGA and Jameco, there is the potential for significant hydraulic connection between the two units. However, data obtained as a result of the supplemental RI activities indicate that the Gardiners Clay acts as a confining unit in the localized area of the Site and the LIAWC well field.

The inter-bedded nature of sediments in the UGA suggests significant vertical and horizontal variability in hydraulic conductivity values. The "20-foot clay" is a discontinuous, semi-confining layer which separates the UGA into an upper and lower zone in some areas of the Site.

The depth to groundwater within the unconfined portion of the UGA ranges from approximately 3 to 15 feet below ground surface (bgs), while ranging from 6 to 17 feet bgs in the semi-confined portion of aquifer. Saturated thickness of the unconfined UGA above the "20-foot clay" layer ranges from 10 to 30 feet. Saturated thickness of the deeper portion of the UGA below the "20-foot clay", including the pressure head component caused by the semi-confined conditions, is approximately 55 to 65 feet.

RESULTS OF THE REMEDIAL INVESTIGATION

The results of the RI indicate that the shallow and deep portions of the UGA have been impacted by CVOC contamination. The shallow UGA groundwater (0 to 30 feet bgs) PCE plume is approximately 3,500 feet long, oriented in a north-south direction. South of Peninsula Boulevard (upgradient), the plume is approximately 1,000 feet wide and north of Peninsula Boulevard (downgradient) the plume is approximately 400 feet wide. (See Figures 2 & 3)

The deep UGA (40 to 75 feet bgs) groundwater plume is approximately 1,110 feet long, oriented in a northeast-southwest direction.

<u>Groundwater</u>

EPA conducted a Membrane Interface Probe (MIP) investigation and Hydropunch® sampling at the Site in 2006 and 2007. A total of 160 groundwater samples were collected from 61 locations. The results of this effort assisted EPA in selecting locations for the installation of groundwater-monitoring wells. Twenty-six monitoring wells were installed at the Site and several rounds of sampling were conducted in 2007, 2008, 2010, and 2011. Analytical results for these samples were compared to the EPA and New York State Department of Health (NYSDOH) promulgated health-based protective Maximum Contaminant Levels (MCLs), which are enforceable standards for various drinking water contaminants.

Groundwater contamination exceeding applicable drinking water standards has been shown to exist within the Site plume area, at highly elevated concentrations in some areas. Chlorinated VOCs, PCE in particular, were identified as the plume-related contaminants of concern for the shallow and deep portions of the UGA at the Site. Seven VOCs were detected at concentrations exceeding applicable criteria. Specifically, PCE was detected at levels up to 30,000 micrograms per liter (µg/l) and TCE, at concentrations up to 10,000 µg/l.

The RI groundwater data indicate that the Site contaminant plume in the deep portion of the UGA, dominated by PCE, appears stable and centered in the south-central portion of the Site.

Information obtained from LIAWC and the results of EPA sampling at new production wells on LIAWC Plant #5 property in October 2010 indicate that the Plant #5 Well Field has contamination similar to that found in the Site plume and, therefore, may have been impacted by the contamination from the Site.

An engineering control (air stripper) is maintained at the Plant #5 Well Field by LIAWC. The treated groundwater is tested and monitored by LIAWC in accordance with New York State and Nassau County rules and regulations. No MCL exceedances of chlorinated VOCs in water distributed to the general public have been identified during the RI.

The results of the RI indicate that the potential for natural attenuation of chlorinated compounds varies across the Site. PCE daughter products were not consistently detected in the same groundwater wells as PCE. Given site-specific conditions, natural attenuation of CVOCs does not appear to be a dominant process in the subsurface.

Surface Water, Soils and Sediments

The RI included sampling of soil at depths of 0-10 feet bgs. Surface soil (0-2 ft bgs) samples were collected at locations along the long axis (N-S) of the plume and in areas of elevated exposure potential. Subsurface soil sample locations were co-located with the Membrane-Interface Probe (MIP) and Hydropunch® groundwater sampling locations.

Surface water and sediment samples were collected from the Doxey Brook Drain, Motts Creek and the unnamed waterway. There were no exceedances of applicable criteria for plume-related compounds in surface water or sediment samples. No VOCs were detected in surface soil and no plume-related VOCs exceeded screening criteria in subsurface soil.

Vapor Intrusion

EPA is investigating the soil vapor intrusion pathway at the Site. VOC vapors released from contaminated groundwater and/or soil have the potential to move through the soil and seep through cracks in basements, foundations, sewer lines and other openings.

EPA conducted vapor intrusion sampling at fifteen residences at the Site. EPA drilled through the sub-slabs in the basements and installed ports in order to sample the soil vapor under these residences. Sampling devices called Summa canisters were attached to these ports to collect air at a slow flow rate over a twenty-four hour period. Summa canisters were also placed outside several residences to determine if there were any outdoor sources that may impact indoor air. The Summa canisters were then collected and sent to a laboratory for analyses.

The results of the analyses indicated that one residence had concentrations of VOCs at or above EPA Region 2 screening levels in sub slab and indoor air. EPA installed a sub-slab depressurization system at this residence in 2009 to mitigate the impacts of soil vapor intrusion by reducing or eliminating vapor entry into the building. EPA sampled indoor air in this residence in 2010 and VOCs were not detected in indoor air.

In addition to sampling residences for soil vapor intrusion, EPA sampled the North Woodmere Middle School in 2004 using a mobile laboratory to analyze the results. PCE was not detected in the basement, the area through which vapors would enter the building if there were vapor intrusion impact from the groundwater plume (there is no slab in the basement, but a dirt floor). No PCE was detected in the classrooms or the auditorium. PCE was detected in trace levels in the art room and in the drains in a bathroom (possibly from art supplies and personal hygiene products such as hair gel). The trace levels detected (0.15 - 0.35 parts per billion or ppb) do not pose any health concern.

EPA will continue to investigate the soil vapor intrusion pathway at the Site.

Source Investigation

The source of the PCE contamination was not identified during the OU 1 RI. Groundwater-plume characteristics (areal extent and relative concentrations) appear to indicate a potential source area at in the area along West Broadway. The wider width of the plume south of Peninsula Boulevard may be the result of comingling of contaminant plumes from additional upgradient source areas, radial groundwater flow induced from pumping, or the flat groundwater surface. EPA is currently conducting an OU 2 RI in order to delineate the source(s) of the groundwater contamination.

RISK SUMMARY

As part of the RI, EPA conducted a baseline risk assessment to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater, surface water and sediment uses. The baseline risk assessment includes a Human-Health Risk Assessment (HHRA) and an ecological risk assessment.

The cancer risk and non-cancer health hazard estimates in the HHRA are based on current reasonable maximum exposure scenarios and were developed by taking into account various health protective estimates about the frequency and duration of an individual's exposure to chemicals selected as chemicals of potential concern (COPCs), as well as the toxicity of these contaminants. Cancer risks and non-cancer health hazard indexes (HIs) are summarized below (please see the text box on page 6 for an explanation of these terms).

The Site is currently a residential neighborhood, with some nearby properties designated as mixed commercial. Future land use is expected to remain the same. The baseline risk assessment began by selecting COPCs in the various media that would be representative of Site risks. The media evaluated as part of the human health risk assessment included soil (0-10 feet), groundwater, and surface water and sediment from the Doxy Brook Drain, Motts Creek and the unnamed waterway. Groundwater at the Site is designated by NYSDEC as a potable water supply. The chemicals of concern (COCs) for the Site are cis-1,2-dichloroethylene (cis-1,2-DCE), PCE, TCE, and vinyl chloride (VC) for groundwater pathways.

The baseline risk assessment evaluated health effects that could result from exposure to contaminated media though use of groundwater for potable purposes (including inhalation of vapors in the bathroom after showering), direct exposure to groundwater in an excavation trench, wading in Site waterways, direct contact exposure to surface (0-2 feet) and subsurface soil (2-10 feet), and inhalation of vapors from surface soils. Based on the current zoning and anticipated future use, the risk assessment focused on a variety of possible receptors, including current and future recreational users, future residents, future commercial workers and future construction workers. However, consistent with the anticipated future use of the Site, the receptors most likely to be in contact with media impacted by site-related contamination [e.g., groundwater] were primarily considered when weighing possible remedies for the Site.

These include the future residents, future commercial workers and future construction workers. A complete discussion of the exposure pathways and estimates of risk can be found in the *Human Health Risk Assessment* for the Site in the information repository.

A screening-level ecological risk assessment (SLERA) was conducted to evaluate the potential for ecological effects from exposure to surface soil, surface water and sediment. Surface soil, surface water, and sediment concentrations were compared to ecological screening values as an indicator of the potential for adverse effects to ecological receptors. A complete summary of the methodology utilized can be found in the *Screening Level Ecological Risk Assessment* for the Site in the information repository.

The results of the RI indicated that sediments and soils were not contaminated with site-related contaminants; therefore, no risks were calculated for exposure to Site sediments or soils. Exposure to surface waters did not pose an unacceptable cancer risk or non-cancer hazard.

EPA is currently conducting an ongoing investigation of vapor intrusion into structures within the area that could be potentially affected by the groundwater contamination plume. To date, one home has received a sub-slab depressurization system to mitigate vapors entering the home. If results of current or future sampling of other homes indicate the presence of site-related vapors above protective levels, EPA would expect to implement similar measures.

Human Health Risk Assessment

EPA's statistical analysis of ground water sampling data found that the average exposure concentration of cis-1,2-DCE, PCE, TCE, and VC in the groundwater were 710 μg/l, 11,000 μg/l, 920 μg/l, and 59 μg/l, respectively. All are in excess of EPA's Safe Drinking Water Act MCLs of 70 μg/l, 5 μg/l, 5μg/l, and 2 μg/l, respectively; these concentrations also exceed the NYSDOH MCLs, which are 5 μg/l for cis-1,2-DCE, PCE, and TCE, and 2 μg/l for VC. These concentrations are associated with an excess lifetime cancer risk 2×10^{-1} for the future adult and child resident and 2×10^{-2} for the future commercial worker. The calculated non-carcinogenic hazard quotients (HQs) are: future adult resident HQ=300, future child resident HQ=600 and future commercial worker HQ=50.

These cancer risks and non-cancer health hazards indicate that there is significant potential risk to potentially exposed populations from direct exposure to groundwater or and groundwater vapors. For these receptors, exposure to groundwater results in either an excess lifetime cancer risk that exceeds EPA's target risk range of 10^{-4} to 10^{-6} or an HI above the acceptable level of 1, or both. The chemicals in groundwater that contribute most significantly to the cancer risk and non-cancer hazard are cis-1,2-DCE, PCE, TCE, and VC.

Ecological Risk Assessment

The SLERA focused on potential exposure to plume-related contaminants (i.e., CVOCs). The CVOCs identified in the surface water, interstitial water and/or sediments include cis-DCE; methylene chloride; PCE; TCE, and VC. While other contaminants were detected in environmental samples, these other compounds and their concentrations may be indicative of the urbanized nature of the area and are not considered site-specific contaminants.

The ecologic receptors evaluated in the risk assessment included benthic macroinvertebrates in the aquatic environment and birds and small mammals in the terrestrial environment. Birds that were observed using the Site included mallard duck, American robin, red-winged blackbird, common grackle, double-crested

WHAT IS RISK AND HOW IS IT CALCULATED?

Human Health Risk Assessment: A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

cormorant, blue jay, mourning dove, white-throated sparrow, green-winged teal, black-capped chickadee, tufted titmouse, northern flicker, song sparrow, Canada goose, northern cardinal, house sparrow, house finch, European starling, and killdeer. Mammals that were observed included Norway rat, raccoon and gray squirrel. Potential risks were not quantified for each observed species, however, the risk for each category of species was estimated using a receptor species (e.g., raccoon) or species groups (e.g., benthic macroinvertebrates) as surrogates to represent the various components of the ecological community.

The ecological receptors were assumed to be exposed to CVOCs in surface waters, interstitial waters and sediments. However, it was assumed that the ecological receptors would not be exposed directly to groundwater resources. Additionally, it should be noted that VOCs were not detected in surface soil samples. Therefore, it is assumed that there was no contamination of these soils from the groundwater plume by the contaminants of concern.

The SLERA analyses included the comparison of the maximum concentrations of the contaminants of potential concern with the most appropriate, conservative ecological screening values that were identified for these compounds for each of the media of interest. The comparison of the maximum concentrations of each contaminant detected in the surface water, interstitial water, sediment, and surface soil with the ecological screening value(s) for each media medium did not reveal any contaminants in excess of these screening values. Additionally, none of the contaminants of interest are known to bioconcentrate, biomagnify, or bioaccumulate.

Based on the results of the SLERA, concentrations of contaminants detected in surface water, interstitial water, sediment and surface soil at the Site are unlikely to pose any unacceptable risks to aquatic or terrestrial ecological receptors at the Site.

Summary of Human Health and Ecological Risks

The results of the human health risk assessment indicate that the contaminated groundwater presents an unacceptable exposure risk. The screening-level ecological risk assessment indicated that the Site does not pose any unacceptable risks to aquatic or terrestrial ecological receptors.

Based upon the results of the RI and the risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the preferred remedy or one of the other active measures considered, may present a current or potential threat to human health and the environment. It is the EPA's current judgment that the Preferred Alternative identified in the Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) 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 for contaminated groundwater (OU 1) will address the human health risks and environmental concerns:

- Restore the impacted aquifer to beneficial use as a source of drinking water by reducing contaminant levels to the federal and State MCLs; and,
- Reduce or eliminate the potential for migration of contaminants towards the LIAWC.

The following remedial action objective for soil vapor will address the human health risks and environmental concerns:

- Address existing or potential future exposure through inhalation of vapors migrating from contaminated groundwater into buildings at the Site.

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, cost-effective, comply with ARARS, and utilize permanent solutions and 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 ARARs under federal and state laws, 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 Site can be found in the FS report. The FS report presents four groundwater alternatives, including a no action alternative. Based on the screening analyses and evaluations performed in the initial stages of the FS, remedial alternatives G3 and G5 were screened out of the final alternatives which are discussed below.

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.

Common Elements

All of the alternatives, with the exception of the no action alternative, include monitored natural attenuation (MNA)/ long-term monitoring to address areas of the plumes outside of the active remediation areas, and institutional controls for groundwater use restrictions. Monitored 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.

Alternative 1: No Action

The National Oil and Hazardous Substance Pollution Contingency Plan (NCP) requires that a "No Action" alternative be developed as a baseline for comparing other remedial alternatives. Under this alternative, there would be no remedial actions conducted at the Site to control or remove groundwater contaminants. This alternative does not include monitoring or institutional controls.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the Site be reviewed at least once every five years. If justified by the review, additional response actions may be implemented.

Capital Cost:	$0
Annual O&M Costs:	$0
Present-Worth Cost:	$0
Construction Time:	Not Applicable

Alternative G2: Enhanced Bioremediation

Capital Cost:	$4,344,000
Annual O&M Costs:	$835,000
Present-Worth Cost:	$15,830,000
Construction Time:	9 – 12 months

This remedial alternative consists of implementing enhanced bioremediation in the plume area. Enhanced bioremediation is the process of destruction of contaminants by microorganisms in contaminated soil and water. Microrganisms consume organic substances for nutrients and energy. Enhanced bioremediation involves creating the proper conditions by injecting microorganisms or nutrients to the subsurface to accelerate the biodegradation of the CVOC contamination. The end products include carbon dioxide, water and microbial cell mass. Monitoring of biogeochemical parameters is used to monitor the effectiveness of remediation.

Enhanced bioremediation can be implemented in different system configurations. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies in the FS, a transect configuration was evaluated. This conceptual design would require the installation of approximately 146 permanent injection wells to remediate contamination in the shallow UGA plume and 78 permanent injection wells to remediate contamination in the deeper UGA. This conceptual design would require further evaluation during the remedial design if chosen to be implemented. Additional wells would have to be installed to monitor the progress of the remediation. This alternative is expected to remove the contaminant mass within eight to 16 years in the shallow UGA plume remediation area and within 25 to 50 years in the deep UGA plume remediation area.

Alternative G4: In-Well Air Stripping

Capital Cost:	$7,730,000
Annual O&M Costs:	$730,000
Present-Worth Cost:	$16,710,000
Construction Time:	9 – 12 months

This remedial alternative includes the installation of in-well air stripping systems over the plume area. In-well air stripping is a physical treatment technology whereby air is injected into a vertical well that is installed and screened at two depths in the groundwater. Pressurized air is injected into the well below the water table, aerating the water. The aerated water rises in the well and flows out of the system at the upper screen, inducing localized movement of groundwater into (and up) the well as contaminated groundwater is drawn into the system at the lower screen. VOCs vaporize within the well at the top of the water table, where the air bubbles out of water. The contaminated vapors accumulating in the wells are collected via vapor extraction contained within the well. Typically, extracted vapors are treated (if necessary) above grade and discharged to the atmosphere. Vapor treatment, if required, generally consists of vapor-phase granular activated carbon (GAC).

The partially treated groundwater is never brought to the surface; it is forced into the unsaturated zone, and the process is repeated as water follows a hydraulic circulation pattern that allows continuous cycling of groundwater. As groundwater circulates through the treatment system in-situ, and vapor is extracted, contaminant concentrations are reduced.

In-well air stripping can be implemented in different system configurations. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies in the FS, a grid configuration was evaluated. This conceptual design would require the installation of approximately 80 permanent air stripping wells to remediate contamination in the shallow UGA plume and 30 permanent air stripping wells to remediate contamination in the deeper UGA. This conceptual design would require further evaluation during the remedial design if chosen to be implemented. Additional wells would have to be installed to monitor the progress of the remediation. This alternative is expected to remove the contaminant mass within five to 10 years in the shallow UGA plume remediation area and within 10 to 20 years in the deep UGA plume remediation area.

Alternative G6: Groundwater Pump and Treat

Capital Cost:	$2,997,000
Annual O&M Costs:	$1,185,000
Present-Worth Cost:	$21,560,000
Construction Time:	6 – 9 months

This remedial alternative consists of the extraction of groundwater via pumping wells and treatment prior to disposal. Groundwater is pumped to remove contaminant mass from areas of the aquifer with elevated PCE concentrations. Pumping from downgradient wells will provide hydraulic control of the contaminated groundwater with lower PCE concentrations. For this conceptual design, it is estimated that nine groundwater extraction wells would be installed in the shallow and deep UGA. A treatment plant with the capacity of approximately 350 (gallons per minute) gpm would be constructed within or nearby the Site to achieve the mass removal and hydraulic control objectives. Extracted groundwater with VOC contamination is typically treated with either liquid phase GAC or air stripping, or both. Air stripper effluent air stream may be treated with vapor phase GAC, if necessary. During the remedial design, a determination will be made whether to discharge treated extracted groundwater to a publically owned treatment works (POTW), surface water or reinjection to groundwater.

In-situ chemical treatment would be utilized to enhance the groundwater pump and treat remedy, as appropriate. During the remedial design, a treatability study would be performed to evaluate the use of in-situ chemical treatment, either in-situ chemical oxidation (ISCO) or in-situ chemical reduction (ISCR). The results of the study would be used to design the in-situ chemical treatment component of this alternative in a manner that complements and improves the effectiveness of the groundwater extraction and treatment component.

ISCO is a process that involves the injection of reactive chemical oxidants (such as Peroxide, Fenton's Reagent, Permanganate) into the subsurface for rapid contaminant destruction. Oxidation of organic compounds using ISCO is rapid and exothermic and results in the reduction of contaminants to primarily carbon dioxide and oxygen. ISCR uses chemical reductants such as zero-valent iron (ZVI). The ZVI donates electrons, acting as the reductant in a reaction that removes chlorine atoms from chlorinated hydrocarbon contaminants such as PCE.

In-situ chemical treatments, such as ISCO and ISCR were evaluated in the initial stages of the FS, but were screened out of the final alternatives as stand-alone remedies, because of the difficulty in implementation in a residential neighborhood, specifically obtaining access to residential properties. However, the use of in-situ chemical treatments targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames and the costs of this alternative.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment, compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, cost, and state and community acceptance. Refer to the table on the next page for a description of the evaluation criteria.

This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how each compares to the other options under consideration. A detailed analysis of alternatives can be found in the FS Report.

Overall Protection of Human Health and the Environment

All of the alternatives except Alternative G1 (No Action) would provide protection of human health and the environment. Alternatives G2, G4, and G6 are active remedies that address groundwater contamination and would restore groundwater quality over the long term. Alternatives G2, G4, and G6 would also rely on certain natural processes to achieve the cleanup levels for areas outside of the treatment zones.

Protectiveness under Alternatives G2 and G4 requires a combination of reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants through maintenance of existing, and implementation of additional institutional controls, as well as MNA.

Protectiveness under Alternative G6 is achieved through reducing contaminant concentrations via extraction and treatment of groundwater. Alternative G6 also protects against the further migration of contaminated groundwater, as the extraction functions as a hydraulic plume containment mechanism.

The long-term monitoring program for groundwater and vapor would monitor the migration and fate of the contaminants and ensure that human health is protected. Combined with MNA, long-term monitoring, and institutional controls, Alternatives G2, G4, and G6 would meet the RAOs. Alternative G1 would not meet the RAOs

Because Alternative G1 (No Action) is not protective of human health and the environment, it was eliminated from consideration under the remaining evaluation criteria.

Compliance with Applicable or relevant and Appropriate Requirements (ARARs)

EPA and NYSDOH have promulgated health-based protective MCLs (40CFR Part 141, and 10NYCRR, 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 at the Site is not presently being utilized as a potable water source, achieving MCLs in the groundwater is an applicable or relevant and appropriate standard, because area groundwater is a source of drinking water. Alternatives G2 and G4 may

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

potentially reach ARARs in the active remediation area of the plume sooner than Alternative G6. However, chemical-specific ARARs will be attained through treatment and certain natural processes (dilution and dispersion) for groundwater in all three of these alternatives.

Alternatives G2, G4, and G6 would comply with location- and action- specific ARARs.

Long-Term Effectiveness and Permanence

Enhanced bioremediation under Alternative G2 is considered a reliable method for reducing contaminant concentrations in groundwater. In-well stripping under Alternative G4 and pump and treat under Alternative G6 are also considered effective technologies for treatment and/or containment of contaminated groundwater, if designed and constructed properly.

All three alternatives rely on a combination of treatment in the active remediation area, natural processes, including dilution and dispersion for areas where active remediation is not implemented, and institutional controls.

Enhanced bioremediation under Alternative G2 has been demonstrated to be effective and reliable at numerous sites for groundwater treatment for CVOCs in contaminated areas. However, groundwater concentrations may rebound if there is continued migration of CVOCs from unknown source areas. Enhanced bioremediation treatment may be required over the long-term to address continued migration of contaminants from unknown source areas into groundwater.

In-well air stripping under Alternative G4 is expected to be effective and reliable to significantly remove CVOCs. However, the effectiveness of this alternative is limited by radius of influence (ROI) or “reach” into the aquifer. The ROI will depend on pumping capacity of each well and the hydrogeologic characteristics of the Site. The ability to secure access to residential properties may impact the placement of the in-well air stripping wells and ultimately the effectiveness of the technology. In addition, the effectiveness of in-well air stripping may be limited in shallow aquifers, due to the lack of vertical space in the well for “stripping.” A field pilot study would be necessary to determine pre-design parameters such as actual ROI, optimal well spacing, flow rates, and pumping capacity prior to full-scale implementation.

Some residual risk above levels of concern would remain under contaminated groundwater in Alternatives G2 and G4; these alternatives rely upon institutional controls and MNA for protection. Residual risk under Alternative G6 would likely be reduced below levels of concern over a longer-term remedial time frame as natural attenuation appears to be limited and contaminant removal from groundwater slower.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives G2, G4 and G6 reduce the toxicity and volume of contaminants at the Site through treatment of contaminated groundwater. Alternative G2 uses biological processes to degrade contaminants in groundwater to less harmful compounds. Alternative G4 uses physical processes to remove the contaminants from the aquifer, and provides chemical treatment for the collected vapor-phase contamination. Alternative G6 removes contaminated groundwater and treats it via a carbon treatment process. Alternative G2 does not remove contamination from the saturated zone, while Alternatives G4 and G6 do remove contamination.

Alternative G2 does not reduce the mobility of the contaminants in groundwater and Alternative G4 may change the movement of contaminants in groundwater because the in-well air stripping treatment is expected to create groundwater mounding. Alternative G6 would be the most effective at reducing the mobility of the groundwater contamination by providing hydraulic control of the plume.

Each of the three active alternatives includes an MNA component for the lesser contaminated portion of the plume outside the active remediation area. MNA would provide limited further reduction in the toxicity and volume of contaminants in groundwater by transforming them into less harmful substances through natural biological, chemical and other processes.

During the enhanced bioremediation and MNA biological degradation processes, PCE, TCE and cis-1,2-DCE could be transformed into the more toxic vinyl chloride under anaerobic conditions in the subsurface, prior to aerobic degradation to the less toxic ethane. This transformation would need to be monitored and managed to prevent exposure via drinking contaminated water or inhalation through the vapor intrusion pathway.

After treatment, Alternatives G4 and G6 would generate residuals in a form of used GAC that would require regeneration, destruction or disposal.

Short-Term Effectiveness

Alternatives G2, G4 and G6 may have short-term impacts to remediation workers, the public, and the environment during implementation. Remedy-related construction (e.g., trench excavation) under Alternatives G4 and G6 would require disruptions in traffic and street closure permits. In addition, Alternatives G4 and G6 have aboveground treatment components and infrastructure that may create a minor noise nuisance and inconvenience for local residents during construction.

Exposure of workers, the surrounding community and the local environment to contaminants during implementation of the three alternatives is minimal. No difficulties are foreseen with managing the required quantity of the bioremediation injection material needed in Alternative G2, as it is non-hazardous. Excavation activities in Alternatives G4 and G6 could produce contaminated vapors that present some risk to remediation workers at the Site. Drilling activities, including the installation of monitoring, in-well air stripping, injection, and extraction wells for Alternatives G2, G4, and G6 could produce contaminated liquids that present some risk to remediation workers at the Site. The potential for remediation workers to have direct contact with contaminants in groundwater could also occur when groundwater remediation systems are operating under Alternative G6. Alternative G6 could increase the risks of exposure, ingestion and inhalation of contaminants by workers and the community because contaminated groundwater would be extracted to the surface for treatment. However, measures would be implemented to mitigate exposure risks.

All three alternatives include monitoring that would provide the data needed for proper management of the remedial processes and a mechanism to address any potential impacts to the community, remediation workers, and the environment. Risk from exposure to groundwater during excavation would also require management via occupational health and safety controls.

Groundwater monitoring and discharge of treated groundwater will have minimal impact on workers responsible for periodic sampling. The time required for implementation of Alternative G6 is estimated at 6 – 9 months. Alternatives G2 and G4 are estimated to take about 9 – 12 months to implement.

RAOs would be achieved in Alternatives G4, G2, and G6 within short, medium and longer time frames, respectively. In-well air stripping is expected to achieve groundwater RAOs within five to 20 years under Alternative G4. Enhanced bioremediation is expected is expected to achieve RAOs within eight to 50 years under Alternative G2, and groundwater pump and treat technology is expected to achieve groundwater RAOs in 30 or more years under Alternative G6. The time frame to meet groundwater RAOs in the non-active remediation area where MNA/LTM would be implemented is difficult to predict, but is expected to exceed 30 years.

Implementability

All three technologies are well-established technologies that have commercially available equipment and are implementable. All three alternatives have access challenges that would have to be addressed with property owners. Of the three alternatives, Alternative G6 Groundwater Pump and Treat is probably the easiest alternative to construct at the Site and would require the least amount of street closure permits and would require less land and disruption in residential areas. Alternatives G2 and G4 would be moderately difficult to construct in the residential areas, requiring securing access to homes and obtaining street closure permits. The need to reconfigure the treatment injection and in-well air stripping well locations in Alternatives G2 and G4 due to access constraints map be possible, however doing so potentially impacts the effectiveness and schedule of these remedial alternatives.

All alternatives would require routine groundwater quality, performance and administrative monitoring, including five-year CERCLA reviews. Alternatives G4 and G6 require periodic operations and maintenance (e.g., substrate injection, GAC replacement) for the life of the treatment.

Cost

The estimated capital cost, operation, maintenance and monitoring (O&M) and present worth cost are discussed in detail in the FS Report. The cost estimates are based on the best available information. Alternative G1 (No Action) has no cost because no activities are implemented. The present worth cost for Alternatives G2 and G4 are $15.8 million and $16.7 million, respectively. The highest present worth cost alternative is Alternative G6, at $21.5 million.

The estimated capital, O&M and present-worth costs for each of the alternatives are presented below.

Alternative	Capital Cost	Annual O&M Cost	Present Worth
G-1	$0	$0	$0
G-2	$4,344,000	$835,000	$15,830,000
G-4	$7,730,000	$730,000	$16,710,000
G-6	$2,997,000	$1,185,000	$21,560,000

State/Support Agency Acceptance

NYSDEC concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for this Site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

PREFERRED REMEDY

Based upon an evaluation of the remedial alternatives, EPA, in consultation with NYSDEC, recommends Alternative G6, Groundwater Pump and Treat, as the Preferred Alternative. Alternative G6 has the following key components: extraction of the groundwater via pumping and ex-situ treatment of the extracted groundwater prior to discharge to a POTW, surface water or reinjection to groundwater (to be determined during design); in-situ chemical treatment of targeted high concentration contaminant areas, as appropriate; monitored natural attenuation for the areas where active remediation is not performed; long-term monitoring in conjunction with implementation of institutional controls. In addition, EPA will continue to evaluate the potential for vapor intrusion at the Site, and will install vapor mitigation systems, where necessary.

The groundwater extraction well network will be designed to effectuate removal of the contaminant mass from the groundwater plume and establish hydrodynamic control of the plume. Figures 4 and 5 provide the conceptual pump & treat well locations within the shallow and deep UGA plume areas. The exact number of extraction wells and their placement will be determined in the remedial design. An aquifer pump test would be conducted as part of the pre-remedial design to collect necessary aquifer data necessary to complete the design of the groundwater pump and treat system.

The use of in-situ chemical treatments, targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames and the cost of this alternative. The implementation of in-situ chemical treatment (e.g. ISCO, ISCR) will be designed to enhance the remediation of the contaminated groundwater in conjunction with the pump and treat system. The remedial design will determine how best to execute the ISCR or ISCO with the pump and treat system.

A treatment plant with the capacity to achieve the mass removal and hydraulic control objectives of the remedy will be constructed within or nearby the Site. EPA estimates that a capacity of 350 gallons per minute may be required. The extracted groundwater would be treated for CVOC removal with either liquid phase GAC or air stripping, or both. Treated groundwater effluent will be discharged to a POTW, surface water, or reinjected to groundwater. The method of discharge will be determined in the remedial design. The design of the treatment facility will take discharge requirements into account.

The pump and treat system would operate until MCLs are attained in the shallow and deep UGA at the Site. The FS presents calculations determining the duration of the operation of the extraction system. These calculations to determine the remedial time frame require additional data regarding contaminant mass flux, as well as more detailed process design to determine the actual number of recovery/injection wells and pore volumes of clean water required to reach RAOs. This data will be collected during the pre-remedial design phase. EPA assumes the duration of this alternative is 30 years or more.

The environmental benefits of the preferred remedy 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 Energy Policy[1]. This will include consideration of green remediation technologies and practices, including GAC regeneration.

Monitored natural attenuation is a necessary component in those areas where active remediation is not anticipated, such as the areas of lower contaminant concentrations at edges of the contaminant plume.

A long-term groundwater monitoring program would be implemented to track and monitor changes in the groundwater contamination and ensure the remedial action objectives are attained. The results from the long-term monitoring program will be used to evaluate the migration and changes in the contaminant plume over time. The long-term monitoring program will be modified accordingly.

The groundwater monitoring well sample results will also be used to track changes in the contaminant plume in order to determine homes considered "at risk" for vapor intrusion. Selected structures/homes determined to be "at risk" would be sampled periodically for vapor intrusion during the winter heating season.

Vapor intrusion caused by volatilization from the groundwater contaminant plume has been monitored by EPA. To date, 15 homes have been sampled and one home has been outfitted with a vapor mitigation system. These systems would be inspected periodically to ensure that they are operating properly. A review of groundwater and vapor data would be relied upon to determine which homes without vapor mitigation systems would be tested in that year's monitoring program. These homes would be monitored through collection of three samples (sub-slab, basement, and first floor) at each building. Vapor extraction systems would be installed, if warranted. EPA will continue to investigate the soil vapor intrusion pathway at the Site.

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

Institutional controls are incorporated into this remedy for protection of human health and the environment over the long term. EPA anticipates using existing government controls to prevent use of groundwater and informational and or governmental controls to ensure that vapor intrusion issues are identified.

While this alternative will ultimately results in reduction of contaminant levels in groundwater to levels that would allow for unlimited use and unrestricted exposure, it will take longer than five years to achieve these levels. As a result, in accordance with EPA policy, the Site is to be reviewed at least once every five years.

Basis for the Remedy Preference

EPA is proposing Alternative G6 due to the difficulty in implementing Alternatives G2 and G4 in the densely populated and fully-developed residential and commercial setting of the Site. Alternative G2, and Alternative G4 to a somewhat lesser degree, would require securing access to a significant number of residential properties to perform construction activities. Under Alternatives G2 and G4, access would be necessary to the residential properties for an extended period of time to perform the initial construction activities and to subsequently conduct monitoring. Under Alternative G2, multiple injections are likely to be necessary over time. These activities would cause a significant disturbance to the residential neighborhood. Reconfiguration of the injection or in-well stripping wells due to access constraints could potentially impact significantly the effectiveness of the technology. Access to install extraction wells under the preferred remedy, Alternative G6 Groundwater Pump and Treat, though still complicated, is more manageable. Access to property and construction of the treatment plant would be performed in an area zoned for commercial activity. Furthermore, the uncertainty of an unknown source investigation that could result in a continued migration of contamination from source areas adds to the uncertainty that the remedial action objectives would be achieved with Alternative G2.

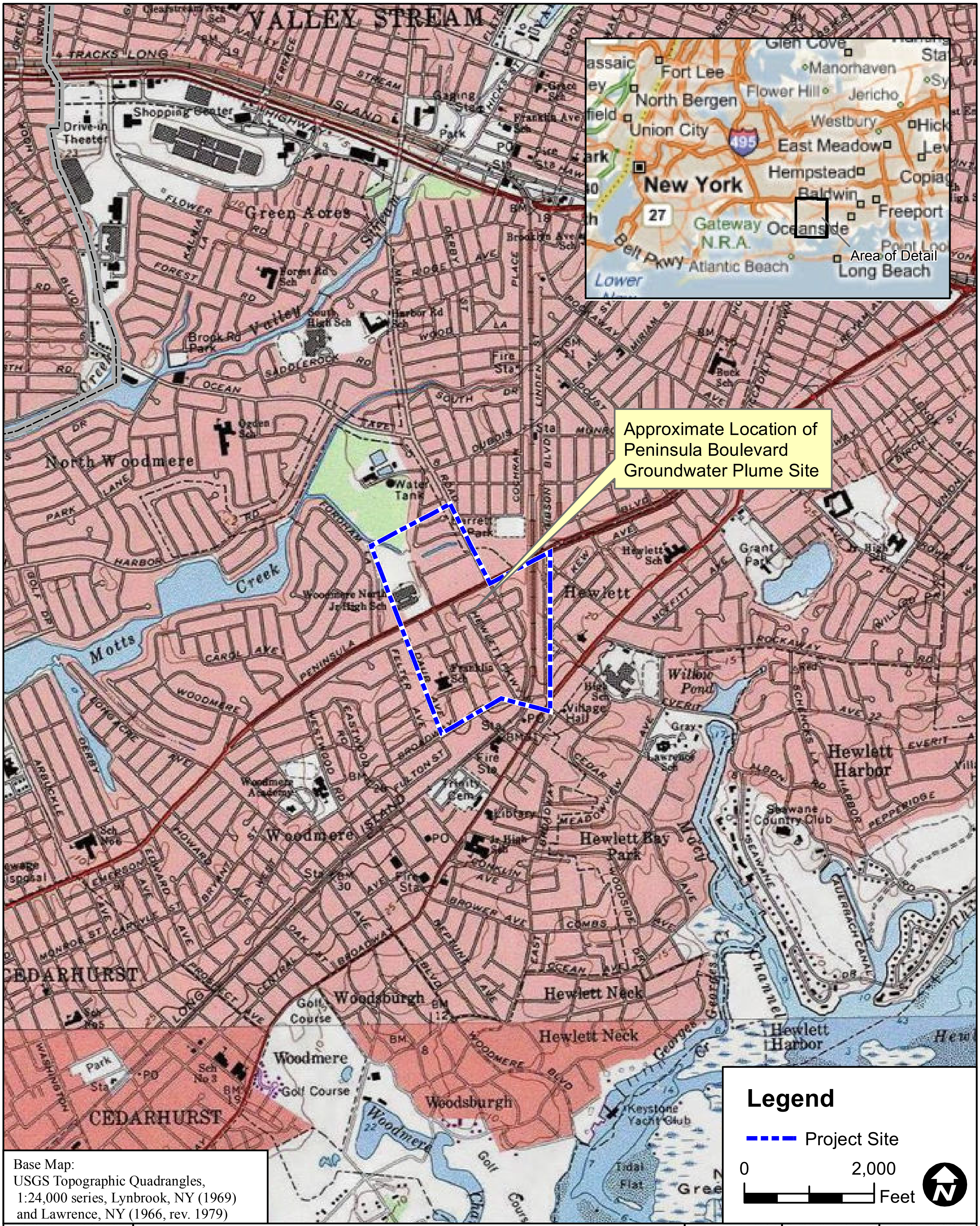
Alternative G6, Groundwater Pump and Treat, uses proven technologies that can be more readily implemented than the other alternatives. The treatment components can be expanded to improve treatment effectiveness or decrease the remedial time frame, if required. Groundwater Pump and Treat has been demonstrated as an effective remedial approach for contaminant mass removal over the long term. This approach would be particularly effective as the contaminant plumes are relatively accessible and have a specific configuration. The shallow UGA groundwater (0 to 20 feet bgs) PCE plume is approximately 3,500 feet long and between 400 and 100 feet wide. The deep groundwater plume is approximately

1,110 feet long. Groundwater Pump and Treat would also be the most effective of the alternatives in establishing hydrodynamic control of the aquifer to minimize off-site migration of contaminants and isolate the contaminated groundwater area. The prevention of off-site migration would prevent CVOC contamination from flowing toward the LIAWC well field. Long-term groundwater monitoring would ensure that remedial action objectives are achieved at the Site.

The preferred remedy is more expensive than either Alternatives G2 or G4. However, there is a greater degree of uncertainty that the remedial action objectives would be achieved by both Alternatives G2 and G4. Based on the Site conditions, Alternative G6, Groundwater Pump and Treat, is the most effective of the alternatives.

The addition of in-situ chemical treatments targeting areas containing high concentrations of PCE that may reside outside the radius of influence of the pump within the inferred plume, as appropriate, in combination with groundwater extraction could potentially reduce the remediation time frames by reducing the contaminant mass of PCE, and, therefore, the costs of this alternative.

EPA, in conjunction with NYSDEC, believes that Alternative G6, Groundwater Pump and Treat, would be protective of human health and the environment, provide the greatest long-term effectiveness, comply with ARARs, and be cost-effective among alternatives with respect to the evaluation criteria. The preferred remedy also will meet the statutory preference for the use of treatment as a principal element.



\\prl-srv3\gis_projects\443005_USEPA REGION 2\0112840_EPAR2-002RICO02TV- PENINSULA\GIS\map_docs\mxd\Draft RI Rpt\Figure 1-1 Site Location.mxd

HDR	Site Location - Peninsula Boulevard Groundwater Plume RI Town of Hempstead, Village of Hewlett Nassau County, New York	Job No.	Date	Figure No.
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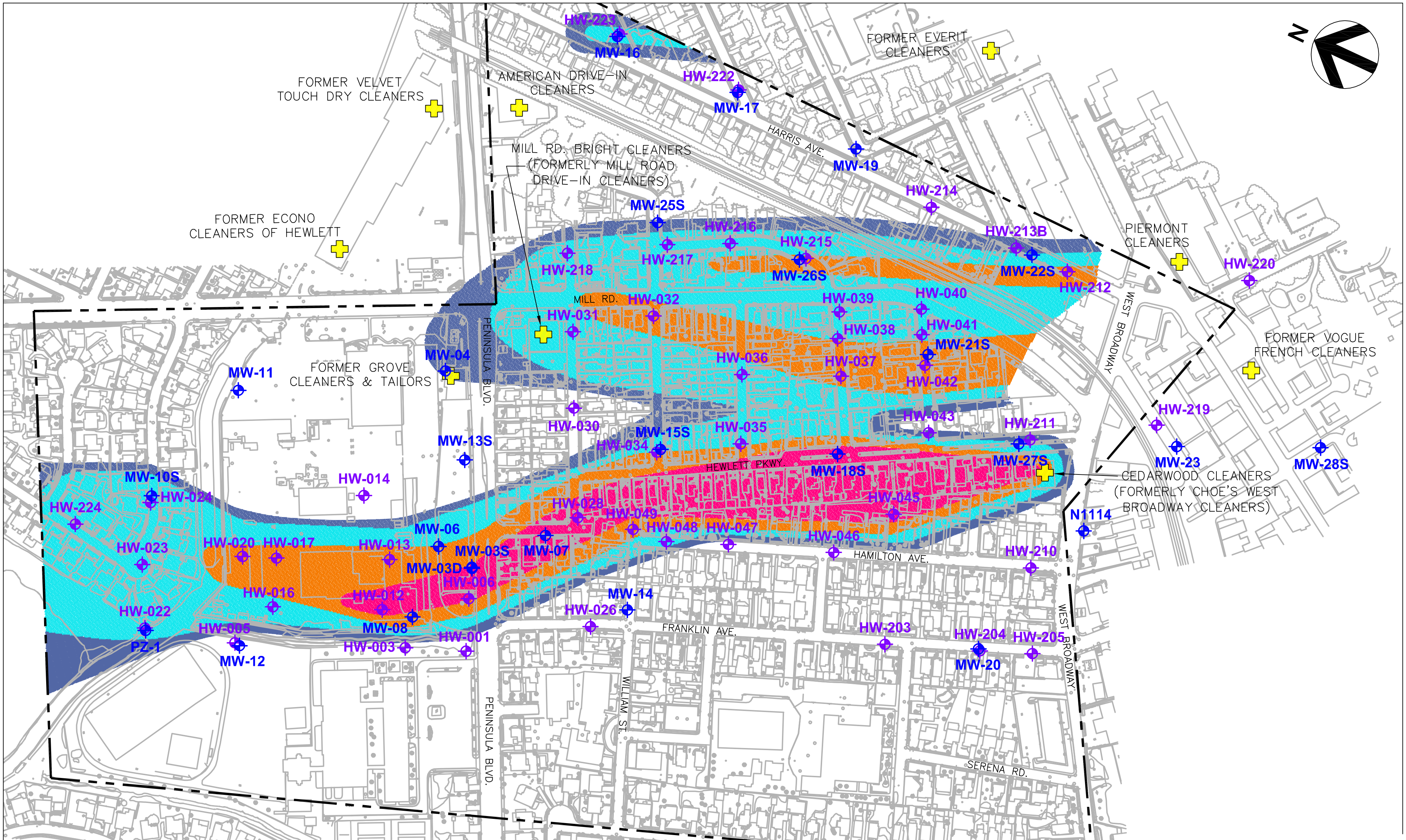


SCALE: 1"=400'

HDR

Henningson, Durham & Richardson, Architecture and Engineering, P.C. in Association with HDR Engineering, Inc.

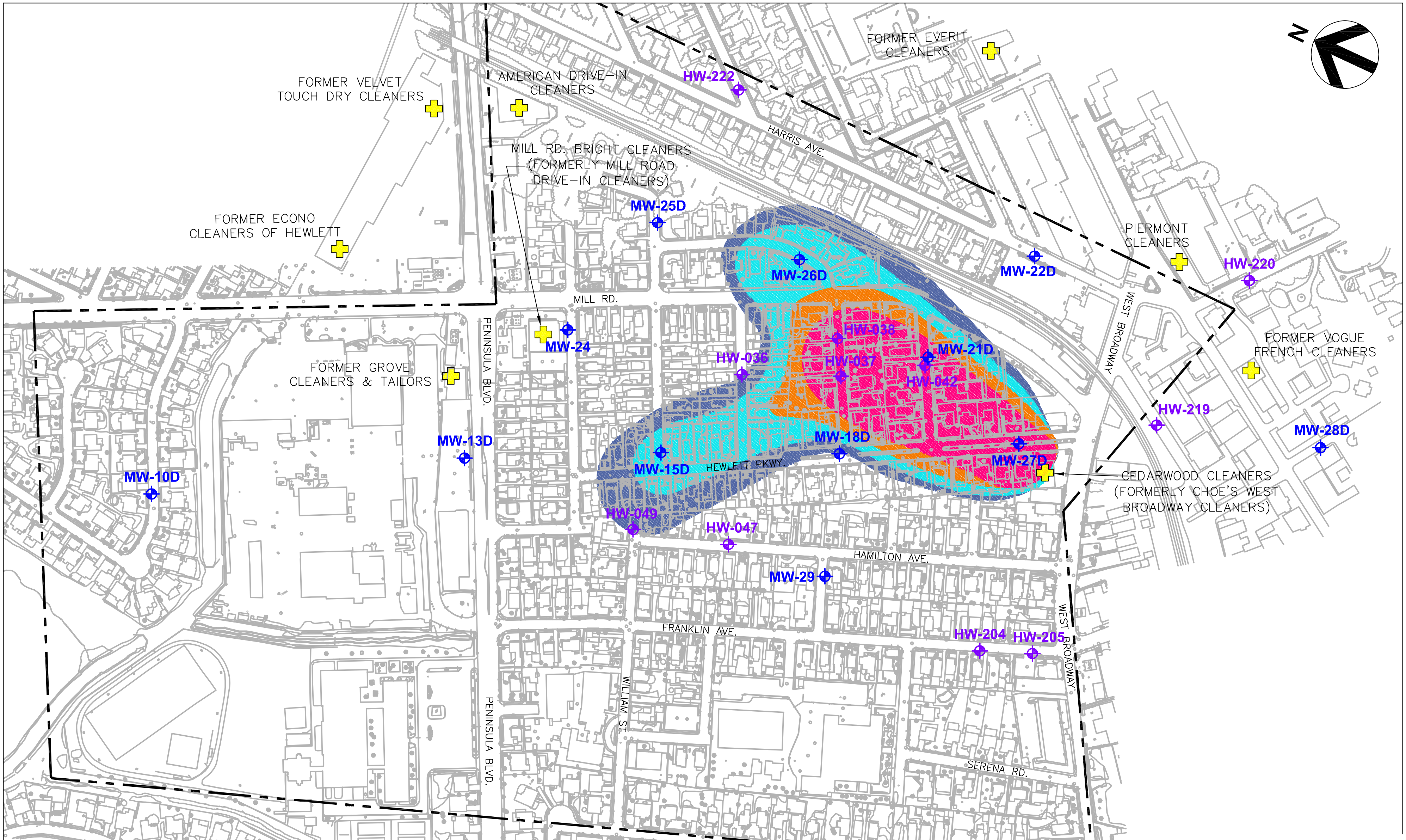
SHALLOW UGA PLUME MAP

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

DATE
06-23-2011

FIGURE
2



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HDR

Henningson, Durham & Richardson, Architecture and Engineering, P.C. in Association with HDR Engineering, Inc.

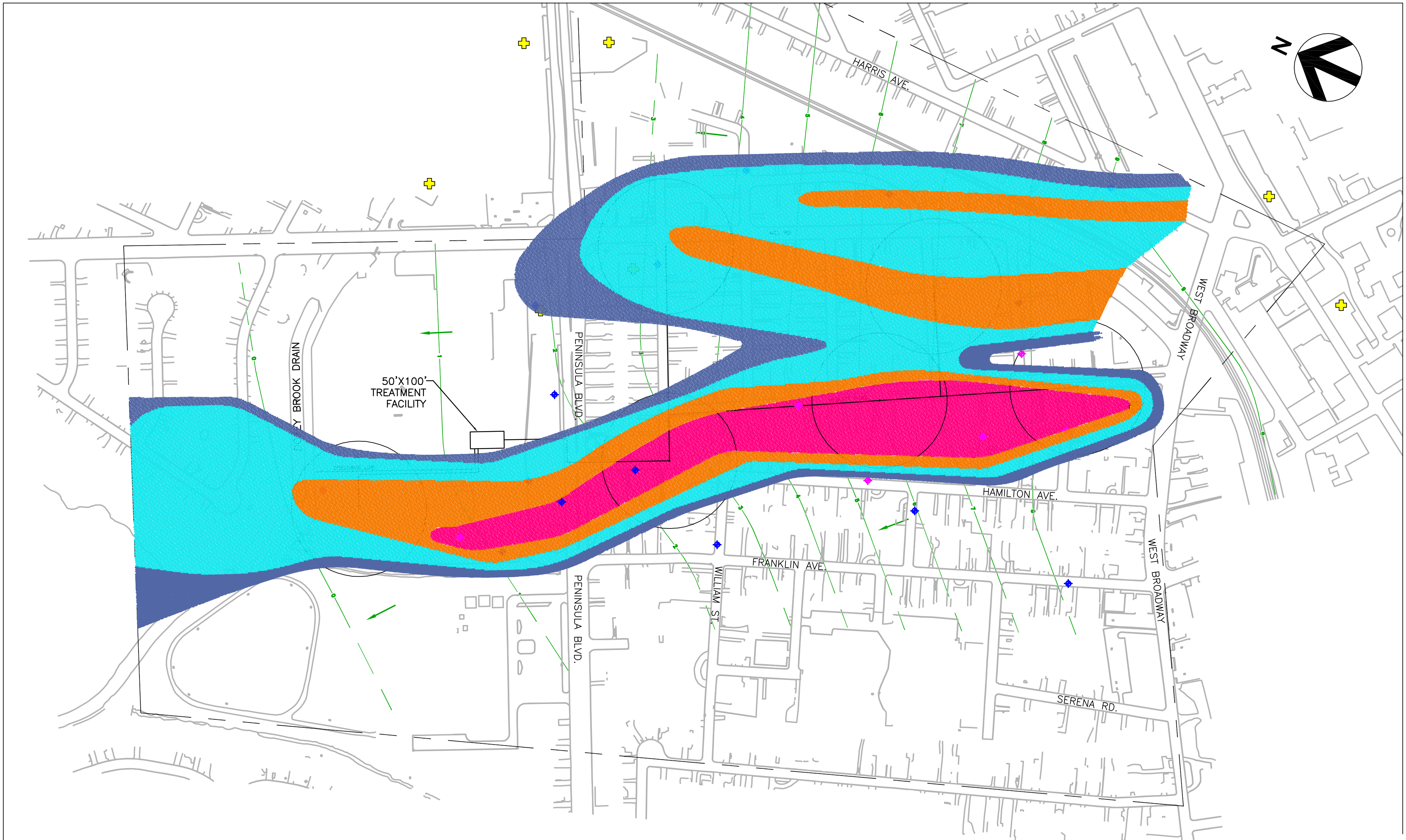
DEEP UGA PLUME MAP

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

DATE 06-23-2011

FIGURE 3



HDR

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SHALLOW UGA PUMP & TREAT LOCATIONS

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME
TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

DATE
06-23-2011

FIGURE
4

SCALE: 1"=400'

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DEEP UGA PUMP & TREAT LOCATIONS

FEASIBILITY STUDY
PENINSULA BOULEVARD GROUNDWATER PLUME

TOWN OF HEMPSTEAD, VILLAGE OF HEWLETT,
NASSAU COUNTY, NEW YORK

DATE 06-23-2011

FIGURE 5