Superfund Program U.S. Environmental Protection Agency

Mansfield Trail Dump Superfund Site

Byram Township, New Jersey

Proposed Plan July 15th, 2019

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternative to address groundwater and residual soil contamination at the Mansfield Trail Dump Superfund Site (site) located in Byram Township, Sussex County, New Jersey (Figure 1). This action for groundwater and soil is referred to as Operable Unit 2 (OU2). Impacted potable wells at the site were addressed as part of OU1.

The Environmental Protection Agency's (EPA) Preferred Alternative to address the contaminated groundwater and soil at the site is Alternative S3-GW4, which includes excavation of residual contaminated soil, capping and vapor extraction (VE) of the source area vadose zone, in situ treatment of the source area saturated zone[1], and monitored natural attenuation (MNA) of the distal groundwater plume.

This Proposed Plan includes a summary of all cleanup alternatives evaluated for OU2 at the site. This document is issued by EPA, the lead agency for the site. EPA, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency, will select a final remedy for the contaminated groundwater aquifer and soils at the Site after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with NJDEP, may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

MARK YOUR CALENDARS

Public Comment Period
July 15th, 2019 to August 13th, 2019.
EPA will accept written comments on the Proposed Plan during the public comment period.

Public Meeting
July 23rd, 2019 at 7:00 P.M.
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 Byram Township Municipal Building at 10 Mansfield Drive, Stanhope, New Jersey.

EPA's website for the Mansfield Trail Dump site: https://www.epa.gov/superfund/mansfield-trail

For more information, see the Administrative Record at the following locations:

EPA Records Center, Region 2
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9 A.M. to 5 P.M.

Sussex County Library Louise Childs Branch
21 Sparta Road
Stanhope, New Jersey 07874
(973) 770-1000
Please refer to website for hours:
http://sussexcountylibrary.org/

[1] The source area *vadose zone* comprises the unsaturated subsurface above the water table – both unconsolidated materials and the upper bedrock - and the source area *saturated zone* is comprised of the subsurface within the water table which occurs in the deeper bedrock.

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 or Superfund) and section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan. This Proposed Plan summarizes information that can be found in greater detail in the OU2 Feasibility Study report, Remedial Investigation report, Data Evaluation Summary report and other documents contained in the Administrative Record file for this site.

SITE DESCRIPTION

The site consists of former waste disposal trenches and impacted soil in a wooded area and associated groundwater contamination. EPA believes that the site was used as a dump for septic wastes and other wastes from the late 1950s through at least the early 1970s.

The site was added to the National Priorities List (NPL) in March 2011 and consists of two OUs covering long-term remedial work.

OU1 addresses private drinking water wells impacted by site contaminants. A ROD for OU1 was issued in September 2017 and the remedy is currently in design. OU2 addresses shallow and deep groundwater contamination and residual soil contamination.

SITE HISTORY

Residential Area

In May 2005, the Sussex County Department of Health and Human Services and NJDEP became aware of trichloroethylene (TCE) contamination, at levels greater than the NJDEP's groundwater quality standards (NJ GWQS) and the New Jersey maximum contaminant level (MCLs) for TCE of 1.0 micrograms per liter (ug/L), in residential wells serving homes on Brookwood and Ross Roads and notified residents about the contamination. NJDEP subsequently installed Point-of-Entry Treatment Systems (POETS) on impacted residential properties to provide safe drinking water. By June 2005, POETs were installed on 13 residential wells that were known to be contaminated with TCE at concentrations in excess of state drinking water standards. Further sampling of the residential wells in the Brookwood and Ross Roads neighborhood conducted by NJDEP in March 2006 indicated the presence of TCE concentrations that ranged from 3.9 to 70 µg/L. Currently, 19 homes are known to be impacted and were equipped with POETS to remove the contamination. Monitoring of residential wells is being performed as part of the OU1 remedy. Impacted homes will be connected to an existing water supply as part of the OU1 remedy, which is currently in the design phase. Vapor intrusion (VI) investigations conducted by NJDEP from 2006 to 2008 in the residential area also lead to the installation of vapor mitigation systems on five affected residences. Upgrades to systems were made as needed.

Initial Dump Area Investigations

NJDEP first identified the former waste disposal trenches at the site in 2009 during an effort to determine the source of the TCE contamination detected in the nearby residential wells. Further investigation conducted by NJDEP and EPA in December 2009 and May 2010 resulted in the discovery of disposal trenches that were designated Dump Areas A, B, C, D and E (Figure 1). The Dump Areas consisted of contaminated soil and sludge-like-waste from unknown origins. NJDEP installed two groundwater monitoring wells in 2009 and sampling showed elevated concentrations of TCE, 1,2-dichloroethylene (1,2-DCE), and vinyl chloride. Soil samples in the dump areas indicated the presence of TCE, cis-1,2-dichloroethylene (cis-1,2-DCE), benzene, ethylbenzene, toluene, and xylene (BTEX) compounds, as well as various chlorinated benzene compounds. EPA collected soil and sludge-like-waste, groundwater (on-site monitoring wells), and residential well samples from February to May 2010. EPA also installed a background monitoring well (MW-3) south of NJDEP's monitoring wells (MW-1 and MW-2) (Figure 3). Analytical results documented the presence of TCE and other volatile organic compounds (VOCs) above NJ GWQSs, MCLs or background conditions in these on-site wells. The TCE groundwater plume was found to begin at the former dump areas and extend downgradient toward the Brookwood and Ross Road residential area (see Figure 2).

During May and June 2010, EPA collected soil, groundwater, and composite waste samples from test borings advanced throughout the Site using Geoprobe™ direct-push technology. Analytical results of soil and waste samples collected during the delineation of the dump areas indicated the presence of significantly elevated concentrations of VOCs, polychlorinated biphenyls (PCBs) and various chlorinated benzene compounds throughout the site. In March 2011, based on the impacted on-site and residential areas outlined above, the site was added to the NPL.

Removal

From February 21 to May 30, 2012, EPA performed a removal action to address hazardous waste material at the site. As part of the action, EPA delineated impacted areas, characterized waste, excavated and disposed of contaminated soil, conducted post-removal confirmation sampling, and backfilled and graded each excavation. EPA excavated contaminated soil from Dump Areas A, B, D and E (see Figure 2). Dump Area C was not excavated because the delineation sampling did not reveal contaminant concentrations exceeding NJDEP soils screening levels. Approximately 11,170 tons of non-hazardous soil and debris and 383 tons of hazardous soil were removed from the site and transported to an EPA approved Resource Conservation and Recovery Act (RCRA) Subtitle D and Subtitle C disposal facilities.

Remedial Investigation

From August 2013 to December 2015, EPA performed the first phase of remedial investigation activities at the site. Ten multilevel system (MLS) groundwater wells and eleven conventional (screened or open-hole) groundwater wells were installed. Wells in the shallow and deep groundwater aquifer were sampled between March 2014 and December 2015. During this phase EPA also collected overburden soil samples, subsurface soil samples, rock core samples, groundwater samples, soil gas and indoor air samples. Samples were taken from both the former dump area and the downgradient residential neighborhood.

A second phase of remedial investigation was performed between 2017 and 2018. Additional groundwater monitoring wells were installed at the site including three MLS wells and two conventional wells. This phase also included surface water sampling, sediment sampling, soil sampling, and three rounds of groundwater sampling. A detailed description of both phases of the investigation is included in the 2019 Remedial Investigation Report.

SITE CHARACTERISTICS

Setting/ Geology/ Hydrology

The site is bordered to the east by a steep, narrow valley where an abandoned railroad bed, a bike trail and a waterway, Cowboy Creek, are located. Cowboy Creek flows north to Lubbers Run and the Musconetcong River. Both Lubbers Run and the Musconetcong River are used for recreation, including fishing, boating, and hiking. Segments of the Musconetcong River downstream of the site are federally designated as a Wild and Scenic River. The groundwater at the site is classified as a NJDEP Class II-A aquifer as described in N.J.A.C. 7:9C Ground Water Quality Standards.

The geology along the top and flanks of the ridge at the site consists of a thin (five feet or less) surficial layer of unconsolidated soil (overburden) overlying bedrock. The upper five to 10 feet of the bedrock is extremely weathered and the deeper bedrock is consolidated, fractured metamorphic and igneous rock (gneiss and pyroxene syenite) with low primary porosity, and thus, a low potential for diffusion of contaminants into the rock matrix. The overburden is thicker in the residential area below the ridge with a maximum thickness of 40 feet. The bedrock underlying the overburden in this area is also fractured igneous and metamorphic rock (gneiss and pyroxene syenite).

Along the ridge, the overburden and the shallow bedrock is mostly unsaturated, with the depth to groundwater approximately 60 to 80 feet below ground surface (ft bgs). In the residential area west and north of the site, the depth to groundwater ranges from approximately 12.5 ft bgs near the ridge to 15.5 ft bgs toward the west northwest.

Groundwater flow occurs primarily in the weathered shallow bedrock and through interconnected fractures in the deeper consolidated bedrock aquifer. Groundwater moves from the higher-elevation former dump areas to the north-northwest and discharges to surficial seeps and the overburden in the lower areas or flows deeper into the bedrock system. Shallow groundwater may discharge from seeps in the exposed bedrock face along the downward slope toward the northeast. Groundwater at intermediate depths may discharge in seeps further downgradient or into the wetland area. Bedrock groundwater continues to flow towards the northwest as the fracture network becomes more confined. The hydraulic conductivity of the bedrock measured at the site ranges from less than 0.001 ft/day to 23 ft/day (or a transmissivity of 345 square feet/day).

Groundwater Contamination

Groundwater was sampled by the EPA in 2014, 2017, and 2018. The highest concentrations of contaminants in groundwater at the site are seen in the shallow bedrock aquifer directly beneath the former dump areas. The areas beneath Dump Area A and D will be referred to as the source area for the purposes of this remedy.

Because of the complex fracture network in bedrock, contamination may be present in discontinuous fractures potentially in the dense non-aqueous phase liquid (DNAPL)[2] phase both in the vadose and saturated portions of the bedrock and may be sorbed to soil that has infilled these fractures. Contamination trapped in fractures can act as a source over time from the flushing action of groundwater table fluctuations or rainwater infiltration.

In April and August 2014, bedrock cores were collected in areas with the highest contaminant concentrations and analyzed to determine if contaminant mass has diffused into the rock matrix. The results indicate that the concentrations in the rock matrix are low and that any minor contaminant mass in the bedrock matrix does not appear to provide a source of contamination to groundwater.

During the rock core sampling and analysis, the full length of each core was visually observed for the presence of nonaqueous phase liquid (NAPL). NAPL was identified within a rubble zone at approximately 68 ft bgs in the upper trench of Dump Area A (CB-3). Additional work will be conducted in the predesign investigation (PDI) to further investigate any NAPL in the subsurface.

Contaminants present in the dissolved phase in the groundwater at the site consist primarily of TCE and cis-1,2-DCE. The distribution of cis-1,2-DCE is similar to that of TCE; however, cis-1,2-DCE was observed at concentrations largely below the state and federal drinking water standards of 70 µg/L. The highest TCE concentrations underlying the former dump areas in the shallow bedrock (approximately 65–80 ft bgs) on the ridge are 320 ug/L and 130 µg/L in the deepest bedrock monitoring well port (approximately 460–475 ft bgs). TCE concentrations decline in the overburden and bedrock aquifers downgradient of the ridge in the residential and Cowboy Creek areas (distal plume) and range from 1.6 ug/L to 36 ug/L, where detected.

Other VOCs detected at elevated concentrations in groundwater include 1,1,1-TCA, 1,1-DCA, and chlorobenzene. 1,4-dioxane is widespread and was detected in 36 of 42 groundwater samples during the third RI sampling event. Concentrations of 1,4 dioxane are generally below standards, with a maximum recorded concentration of 7.3 µg/L, exceeding NJ GWQS of 0.4 µg/L. Lead, which is present in shallow soil, exceeded NJ GWQS of 5 µg/L in groundwater in two of four samples in the third sampling event, with a maximum concentration of 9.5 µg/L.

Data collected at the site indicate natural attenuation mechanisms are actively attenuating groundwater contaminant concentrations. Evidence for natural attenuation at the site includes:

1) a downward trend is observed in residential well concentrations prior to the 2012 excavation, 2) Compound Specific Isotope Analysis (CSIA) indicates that degradation is occurring in groundwater between the shallowest ports of the source zone wells (e.g., where mass may be discharging to groundwater from the vadose zone source) and the downgradient wells, 3)

[2] A dense non-aqueous phase liquid or DNAPL is a denser-than-water liquid that is immiscible in or does not dissolve in water readily.

microbiology sample results indicate that the principal zone of reactivity for destructive attenuation appears to be under and directly adjacent to the former dump areas, 4) CSIA and microbial data indicate that both microbial reductive dehalogenation and aerobic cometabolic degradation of TCE are biodegradation mechanisms actively attenuating groundwater concentrations at the site, and 5) dilution and dispersion are also actively attenuating groundwater concentrations at the site as evidenced by declining concentrations from the ridge to the distal plume.

Residential Wells and Vapor Intrusion

Based on sampling conducted by residents and NJDEP, 19 residential wells in the site area were found to contain TCE concentrations above the NJ GWQS of 1 µg/L. EPA performed several rounds of residential well sampling as part of the remedial investigation. NJDEP continues to monitor and maintain eligible POETS at impacted residences under the state Spill Compensation Fund. A Record of Decision was signed in 2017 to provide a waterline to assure a source of potable water to impacted residences at the site. Design of this remedy is currently ongoing.

Vapors migrating from the groundwater plume extending beneath the residential area have the potential to act as a source of indoor air contamination. After initial sampling completed by NJDEP in 2006, five vapor mitigation systems were installed at impacted residences. Multiple rounds of sub-slab and indoor air samples collected at residences associated with the residential wells (from 2011 to 2019) were analyzed since then. Recent sub-slab and indoor air concentrations at residential properties indicate that installed mitigation systems are effective.

Soil, Sediment and Surface Water Contamination

The highest concentrations of contaminants in soil were found to be confined to the upper two feet in an area north of Dump Area A, then continuing downslope into the rear (southern) portion of a residential property on Brookwood Road. In the residential area PCBs were detected in soil in 20 out of 38 samples at a maximum concentration of 2.8 milligrams per kilogram (mg/kg) (Aroclor 1254) and detected at 23 out of 92 samples in the former dump areas at a maximum of 2.4 mg/kg (Aroclor 1260). The EPA residential soil screening level for both Aroclor 1254 and Aroclor 1260 is 0.24 mg/kg. Lead was detected at a maximum of 1,460 mg/kg, exceeding the state residential soil standard of 400 mg/kg in 7 out of 38 samples in the residential area and 1 out of 92 samples in the former dump areas.

The slope where the highest concentrations of PCBs are found is generally steep and only has a few feet of overburden soil above the bedrock surface. The extent of contamination is confined to the slope with samples collected in the residence's backyard. Samples from the adjacent properties were below the EPA residential soil screening level. This data and topography suggest PCB-containing materials were dumped in or around Dump Area A and have migrated via surficial runoff or movement of fine-grained materials down the steep slope and onto a portion of the residential property. Some very limited areas of soils with elevated PCBs were found in former dump areas B and E. PCBs were not detected in other site media including sediments, surface water, or groundwater during the 2014 or 2017 investigations.

Sampling in the residential area soil and sediments did not reveal any VOCs above the federal and state standards. Concentrations of polyaromatic hydrocarbons (PAHs) in soil exceeded screening criteria in 2 of 82 samples in the former dump areas and in 1 of the 16 samples in the residential area during the 2014 investigation. PAH data suggest only minor isolated impacts related to site dumping. The highest concentrations of PAHs found in the former railroad bed area are likely related to the rail ties or other processes that left behind these materials and are not site-related.

The lead and chromium data from the media other than soil do not suggest significant impacts related to site dumping, but rather natural background conditions. In sediment, lead and chromium (trivalent in dump waste and in groundwater samples) were detected at concentrations up to 76.8 mg/kg and 16.1 mg/kg, respectively, but all detections were below levels naturally found in the area. PAHs exceeded the federal and state standards and background in one sediment sample adjacent to a former railroad bed. However, the PAH concentrations observed in this sample were an order of magnitude higher than those found in site soil, suggesting non-site related impacts from rail ties or other processes. Three pesticides (gamma-chlordane, 4,4'-DDE, and 4,4'-DDT) were detected in the same sample, but the low concentration suggests the contamination in the sediment sample is likely non-site related. No other site-related contaminants were detected in sediment.

In surface water, TCE was detected at 0.15 μg/L at one location (SW-03), below the state and federal criteria for surface water quality for fresh water (1 μg/L and 2.5 μg/L respectively). Other site-related contaminants were similarly detected at low concentrations (1,4-dioxane at up to 0.12J μg/L and lead at up to 6.1 μg/L). Shallow aquifer seep sampling was also performed in the residential area where seeps had been observed after large rain events. TCE and cis-1,2-DCE were detected in the results from the groundwater seep, TCE exceeded state and federal screening criteria at a maximum concentration of 34 μg/L. Since there is a direct pathway from groundwater to surface water, by remediating the contaminated groundwater, site-related contamination in surface water (primarily the TCE and 1,4-dioxane from groundwater discharge) are expected to be addressed.

Principal Threat Waste

The NCP, which governs EPA cleanups, at 40 C.F.R. § 300.430(a)(1)(iii), states that EPA expects to use "treatment to address the principal threats posed by a site, wherever practicable" and "engineering controls, such as containment, for waste that poses a relatively low long-term threat" to achieve protection of human health and the environment. This expectation is further explained in an EPA fact sheet (OSWER #9380.3-06FS), which states that principal threat wastes are source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Low-level threat wastes are source materials that generally can be reliably contained and that would present only a low risk in the event of exposure**.**

The concept of principal threat and low-level threat waste is applied on a site-specific basis when characterizing source material. Source material is defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, air, or act as a source of direct exposure.

Site soil, contaminated with lead and PCBs, is not considered a principal threat waste as it is not considered source material and is not highly mobile. Groundwater is not considered principal threat waste. The completed removal action addressed source material which was principal threat waste within the dump areas. Residual DNAPL, though not detected in the RI or observed in the confirmation samples from the removal action, may still be present in the subsurface in low-transmissivity fractures in this underlying bedrock and could potentially act as a source of contamination to groundwater. The mobility of any residual source material would be limited if it is present in low-transmissivity fractures.

SCOPE AND ROLE OF THE ACTION

This Proposed Plan presents the Preferred Alternative for the final action to addresses residual soil contamination and contaminated groundwater (OU2) at the site. A ROD issued by EPA in 2017 selected an action to provide potable water to impacted residents through connection to a public water supply (OU1). The OU1 remedy is currently in the design phase.

SUMMARY OF SITE RISKS

Human Health Risks

The baseline human health risk assessment (HHRA) for the site quantified risks and hazards to human health associated with exposure to media present in OU2. The four-step process is comprised of: Hazard Identification, Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Risk and How is it Calculated").

The HHRA included evaluation of risks to potential receptors, including utility workers and trespassers in the former dump area, recreational users of the bike trail, nearby residents, recreational users of Cowboy Creek, and future construction workers in the former dump area if the site is redeveloped.

Elevated potential risks/hazards were identified for future residents exposed to untreated groundwater from the most contaminated area of the site and current/future exposure to surface soil in the residential area. Cancer risks for future residents exceeded EPA's target risk range of 1 x 10^{-4} (one-in-ten thousand) to 1 x 10^{-6} (one-in-one million), primarily due to groundwater used as tap water. The estimated excess lifetime cancer risks for vinyl chloride and TCE in groundwater are 4 x 10^{-3} and 5 x 10^{-4} respectively. Noncancer hazards for future residents were driven primarily by TCE, and to a lesser extent cobalt and cis-1,2-DCE, in groundwater. The calculated hazard index (HI) for residential exposure to groundwater is 111 for both an adult and child, which exceeds EPA's hazard threshold (HI of 1). Risks due to lead exposure from contaminated soil and groundwater were evaluated using the Integrated Exposure Uptake Biokinetic (IEUBK) model, which predicted 41% of children age 12-72 months could have blood lead concentrations above the reference value of 5 µg/dL. Lead concentrations at the site represent an elevated risk exceeding EPA's risk reduction goal of 5%.

Potential risks/hazards associated with soil in the former dump area and bike trail area and with sediment and surface water in cowboy creek were not elevated. Although the property containing the former dump areas is currently zoned as residential, current and anticipated future use of the property is expected to remain non-residential. When conservatively assuming residential exposures in the former dump areas, the cancer risk and noncancer HI for adult residents are at or below EPA's risk thresholds. The total noncancer HI for child residential receptors to soil in the former dump areas is 2 and exceeds EPA's target of 1, however no hazard quotient for an individual chemical or target organ exceeds 1 and therefore noncancer health effects would be unlikely.

The HHRA included a screening evaluation of potential health risks from future exposure to vapors migrating from contaminated groundwater into houses via vapor intrusion. This exposure pathway is currently incomplete because mitigation systems are in place for residences that were affected by vapor intrusion. Based on vapor intrusion screening, TCE and chloroform present in the vadose zone below houses are elevated relative to human health screening levels. Therefore, vapor intrusion may also be a source of risk to receptors at the site if mitigation systems are removed or not maintained, or if the shallow groundwater plume migrates below houses that do not have mitigation systems.

WHAT IS RISK AND HOW IS IT CALCULATED?

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 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 noncancer 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 noncancer 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 noncancer 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 noncancer health effects, a "hazard index" (HI) is calculated. The key concept for a noncancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which noncancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a noncancer 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 document, or Record of Decision.

Ecological Risk Assessment

A screening level ecological risk assessment (SLERA) was conducted for the site to determine the potential for risk to ecological receptors based upon exposure to contaminants in soil, surface water, and sediment. Site media were screened against values protective of ecological receptors and food chain modeling was conducted to determine risks to trophic level receptors. The results of the SLERA identified contaminants of potential ecological concern (COPECs) and therefore the risk assessment process continued on to a Step 3a analysis. The objective of the Step 3a analysis was to determine if chemicals of potential COPECs identified in the SLERA pose risk under more realistic conservative assumptions. During the Step 3a, refined exposure point concentrations were calculated based upon 95% UCL values and background inorganic results were considered. Screening of soil, sediment and surface water media contaminants indicated exceedances of screening values. Further, food chain modeling was conducted using more realistic exposure frequency and ingestion variables. The results of the Step 3a evaluation indicated fewer risks from exposure to chemicals detected in site media when compared to the SLERA. Overall, food chain modeling results indicated no risk to terrestrial soil receptors based upon the calculation of lowest observed adverse effect level (LOAEL) hazard quotients. In the aquatic environment, risk was identified to the invertivorous bird (the spotted sandpiper) from exposure to zinc. However, based upon a comparison of the range of site sediment zinc concentrations to background sediment zinc concentrations it is unclear whether zinc sediment concentrations are site related. In addition, a preliminary remedial goal for zinc was calculated based upon risk to the spotted sandpiper. This value was less than site background concentrations and therefore it was determined that action to address zinc in sediment was not warranted.

The Preferred Alternative identified in the Proposed Plan, or one of the other active measures considered in this 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) were developed for soil and groundwater. The remediation of contaminated soil and groundwater is expected to decrease site related contaminant concentrations in vapor to meet remediation goals for indoor air.

The RAOs for contaminated soil are:

- Reduce or eliminate exposure of human receptors to contaminated soil at concentrations exceeding remedial goals.
- Prevent or minimize contaminated soil from serving as a source of contamination to sediment, surface water, and groundwater.

The RAOs for contaminated groundwater are:

- Restore the impacted aquifer to its most beneficial use as a source of drinking water by reducing contaminant levels to the remedial goals
- Prevent or minimize unacceptable risk from exposure (via direct contact, ingestion, or inhalation) to contaminated groundwater attributable to the site
- Minimize the potential for further migration of groundwater containing site contaminants at concentrations greater than remedial goals
- Prevent or minimize contaminated groundwater from serving as sources of current and future vapor intrusion.

Achieving the RAOs relies on the remedial alternatives' ability to meet final remediation goals derived from Preliminary Remediation Goals (PRGs), which are based on such factors as Applicable or Relevant and Appropriate Requirements (ARARs), risk, and background. EPA and NJDEP have promulgated MCLs and NJDEP has GWQSs which are enforceable, health-based, protective standards for various drinking water contaminants. In this Proposed Plan, EPA selected the more stringent of the MCLs and GWQSs as the PRGs for COCs in site groundwater. EPA used the more stringent of the NJDEP residential direct contact soil remediation standards and the NJDEP impact to groundwater soil screening levels as the PRGs for the unsaturated soils.

The Lists of PRGS for groundwater and soil may be found in Tables 1 and 2 respectively. PRGs may be further modified through the evaluation of alternatives and are used to select the clean-up goals in the Record of Decision.

The suitable sub-slab contaminant-screening criteria and indoor air concentration requiring mitigation were based on EPA's vapor intrusion screening levels (VISLs) guidance for residential properties. However, the VISLs are frequently updated based on evolving toxicity information. Therefore, the screening criteria may be subject to change. The latest screening criteria for vapor intrusion will be used to evaluate vapor intrusion data collected in the future.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA, Section 121(b)(1), 42 U.S.C. Section 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective 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, Section 121(d), 42 U.S.C. Section 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 Section 121(d)(4), 42 U.S.C. Section 9621(d)(4).

In accordance with the Superfund program, a preliminary screening evaluation of the soil and groundwater remedial alternatives was completed to assess whether alternatives could be screened out prior to a detailed evaluation. The alternatives that were screened out were removed from consideration and not evaluated as part of the detailed analysis of alternatives. Additional details on the rationale for screening out technologies are mentioned in the FS.

Eight alternatives were retained for a detailed evaluation against the seven National Contingency Plan (NCP) evaluation criteria. Three alternatives were retained to address contaminated soil and five alternatives were retained to address contaminated groundwater. The sections below present a summary of the alternatives that were retained and evaluated. The Present-Worth Costs are based on a 30-year timeframe in accordance with EPA guidance.

The time frames presented below for construction do not include the time for pre-design investigations, remedial design, or contract procurements. Detailed descriptions of the remedial alternatives for OU2 can be found in the FS report.

<u>Institutional Controls</u>

Institutional controls are administrative and legal controls that help to minimize the potential for human exposure to contaminants. Institutional controls may include a classification exception area/well restriction area (CEA/WRA) for groundwater and a deed notice for capped areas. These institutional controls limit future use of the site soil and groundwater and are common components of each of the alternatives.

Soil Alternatives

<u>Alternative S-1 – No Action</u>

The No Action Alternative is presented, as required by the NCP, and provides a baseline for comparison with other alternatives. No remedial actions would be implemented as part of the No Action Alternative. Furthermore, this alternative would not involve any monitoring of groundwater or institutional controls.

Capital Cost:	$0
O&M Cost:	$0
Present-Worth Cost:	$0
Estimated Construction Time Frame:	0 years

<u>Alternative S-2 – Capping</u>

Alternative 2 includes the capping of the contaminated soil in a residential area and targeted excavation of residual contaminated soil in the former dump areas to eliminate exposure pathways to receptors.

A Preliminary Design Investigation (PDI) would further delineate the soil contamination and confirm the extent of the cap. The cap would include erosion control fabric for stabilization on the steep slope and new drainage pathways would be incorporated into the cap to allow for surface runoff from the dump areas upgradient to discharge safely and in a controlled manner. Limited excavation would be performed in the former dump areas where contaminant levels were identified as not meeting PRGs. This would prevent any future migration of contaminants in soil through surface runoff. After excavation and appropriate disposal, confirmation sampling would be conducted to verify that soil concentrations meet remedial goals.

Operation and maintenance would include regular inspection to ensure the cap is stable and intact over time. Engineering controls including diversion structures and temporary fencing may also be needed in the remediation areas. Institutional controls in the form of a deed notice would be implemented to restrict disturbance to the soil cover and intrusive activities near a residential area for the duration of construction and O&M of the cap. Since CERCLA wastes would be left on the site above levels that allow for unlimited use and unrestricted exposure, five-year reviews would be conducted to monitor the contaminants and evaluate the need for future actions.

Capital Cost:	$ 1,796,000
Present Worth of O&M Cost:	$ 54,000
Present-Worth Cost:	$ 2,467,000

Estimated Construction Time Frame: 9 months

Alternative S-3 – Excavation and Off-Site Disposal

Alternative 3 includes the excavation and off-site disposal of contaminated soil in the residential and former dump areas. A PDI would further delineate the soil contamination to confirm the extent of excavation. It is assumed excavation would be conducted with a combination of small excavation equipment and hand excavation. After excavation and appropriate disposal, confirmation sampling would be conducted to verify that soil concentrations meet PRGs. If confirmation sampling reveals additional contamination, further excavation would be performed in the area where the contamination is identified.

After site soil is confirmed to meet PRGs, excavated areas would be backfilled with imported clean fill and topsoil, compacted, and graded. Drainage pathways, if previously disturbed during excavation activities, would be restored to original conditions.

Capital Cost:	$ 2,399,000
Present-Worth Cost:	$ 2,399,000

Estimated Construction Time Frame: 10 months

Groundwater and Bedrock Vadose Zone Alternatives

Common Elements

For Groundwater Alternatives GW-2 through GW-5 a PDI would be performed to refine the vertical and horizontal extents of the areas requiring remediation. Surface water monitoring and vapor monitoring in the residential area would also be performed to ensure contaminated groundwater is not impacting surface water and residents are protected from potential vapor intrusion. Maintenance of existing VI mitigation systems and installation of new systems would be completed as necessary. Monitoring of the residential wells within the distal plume will be conducted through the OU1 remedial action. Therefore, the OU2 remedial action would coordinate with OU1 remedial action. Monitoring requirements for sub-slab and indoor air will be developed during the design phase. In all alternatives site restoration would be completed as necessary to original conditions after construction activities are completed. Institutional controls, such as a CEA/WRA, would be required to prevent the installation of wells in the contaminated groundwater plume, at least while the remedy is being implemented. A deed notice would be required for capped areas (which do not include any residential properties). Where CERCLA wastes are left in place above levels that allow for unlimited use and unrestricted exposure, a five-year review is required to monitor the contaminants and evaluate the need for future actions.

Alternative GW-1 – No Action

As with the soil alternatives, regulations governing the Superfund program generally require that the “no action” alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action to address contaminated groundwater within the OU2 Study Area to prevent human exposure and restore the groundwater aquifer.

Capital Cost:	$0
O&M Cost:	$0
Present Worth Cost:	$0
Estimated Construction Time Frame:	0 years

Alternative GW- 2 – Capping of Source Area Vadose Zone and MNA of Source Area Saturated Zone and Distal Plume

Under this alternative, the contaminated source area bedrock vadose zone would be capped to reduce infiltration of rainwater, thus limiting the migration of vadose zone contamination into groundwater. Monitored natural attenuation would be implemented for the groundwater contamination in the source area and the distal plume. An extensive monitoring program would be conducted to evaluate groundwater contaminant concentrations over time to ensure that attenuation mechanisms, such as biodegradation, are reducing concentrations at an acceptable rate throughout the plume. The cap would require long term O&M.

Capital Cost:	$ 2,167,000
Present Worth of Cap O&M Cost:	
Year 1 to 5:	$ 194,000
Year 6 to 10:	$ 103,000
Year 11 to 30:	$ 126,000
Present Worth of Monitoring:	$ 1,564,000
Total Present Worth Cost:	$ 4,154,000
Estimated Construction Time Frame:	11 months

Alternative GW- 3 – Capping and SVE of Source Area Vadose Zone and MNA of Source Area Saturated Zone and Distal Plume

The contaminated source area bedrock vadose zone would be capped as described in Alternative 2, while vapor extraction would be implemented to actively treat any residual contamination in the source area bedrock vadose zone.

Vapor extraction removes contaminant vapors from the subsurface for treatment above ground. Vapors would be extracted from the bedrock vadose zone above the water table by applying a vacuum. The cap would serve as an impermeable barrier to enhance the performance of the vapor extraction system and to prevent rainwater from infiltrating into the treatment zone. A pilot study would be conducted prior to implementation to determine design parameters for the vapor extraction system. Vapor extraction wells would be installed within the confirmed extent of the source area vadose zone and vapor monitoring points would be installed to track the progress. Extracted vapor would be treated prior to discharge. The system is expected to be run for approximately 5 years.

Monitored natural attenuation would be implemented in the distal plume. An extensive monitoring program would be conducted to evaluate groundwater contaminant concentrations over time to ensure that attenuation mechanisms, such as biodegradation, are reducing concentrations at an acceptable rate.

If vapor extraction is effective in substantially reducing mass in the subsurface, a multilayered cap with associated long-term O&M, may not be needed. Long-term O&M of a multilayered cap is currently included in the cost estimates and, therefore, costs may decrease if it is found to be unnecessary.

Capital Cost:	$ 4,078,000
Present Worth of Cap O&M Cost:	
Year 1 to 5:	$ 194,000
Year 6 to 10:	$ 103,000
Year 11 to 30:	$ 126,000
Present Worth of Monitoring:	$ 1,564,000
Present Worth Cost:	$ 6,528,000
Estimated Construction Time Frame:	23 months

Alternative GW- 4 – Capping and Soil Vapor Extraction (SVE) of Source Area Vadose Zone, In Situ Treatment of Source Area Saturated Zone, and MNA of Distal Plume

For this alternative vapor extraction and capping would be implemented as described in Alternative 3 for the contaminated source area bedrock vadose zone. In situ treatment would also be conducted to treat the shallow bedrock groundwater plume in the source area, including the injection of amendments such as zero valent iron or bioaugmentation amendments. This type of amendment would be decided on during the remedial design and selected based on ability to treat contaminants in the aquifer.

A treatability study would be conducted to determine the amendment that would be the most effective for the site contaminants and complex geologic setting. The amendment would be designed to have long-term interaction with groundwater contamination in bedrock fractures for sustained reactivity.

Performance monitoring would be conducted throughout operation of active treatment. MNA would be implemented for groundwater contamination in the distal plume as described in Alternative GW-3.

Capital Cost:	$ 6,410,000
Present Worth of Cap O&M Cost:	
Year 1 to 5:	$ 194,000
Year 6 to 10:	$ 103,000
Year 11 to 30:	$ 126,000
Present Worth of Monitoring:	$ 1,564,000
Present Worth Cost:	$ 9,106,000
Estimated Construction Time Frame:	30 months

Alternative GW- 5 – Capping, Dual Phase Vapor Extraction (DPE) of Source Area Vadose and Saturated Zones, and MNA of Distal Plume

Alternative GW-5 includes combined vapor and groundwater extraction in a dual-phase extraction (DPE) remedy to treat both the contaminated vapors in the source area bedrock vadose zone and the groundwater plume in the source area. DPE includes vapor extraction to draw both contaminated vapors and groundwater from the subsurface, with subsequent treatment at the surface to remove contaminants.

Capping and vapor extraction would be implemented as described in Alternative GW-3. Design parameters for a DPE system would be obtained through the performance of a pilot study during the design phase. Vapor monitoring points would be installed to track the performance of the vapor extraction system. Extracted vapor and groundwater would be treated prior to discharge. Depending on groundwater extraction rates, treated water might be discharged to the aquifer or to public sewer systems. MNA would be implemented for groundwater contamination in the distal plume as described in GW-3.

Capital Cost:	$ 4,837,000
Present Worth of Cap O&M Cost:	
Year 1 to 5:	$ 194,000
Year 6 to 10:	$ 103,000
Year 11 to 30:	$ 126,000
Present Worth of Monitoring:	$ 1,564,000
Present Worth Cost:	$ 7,872,000
Estimated Construction Time Frame:	22 months

THE NINE SUPERFUND EVALUATION CRITERIA

1. 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.

2. 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.

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

4. 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.

5. 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.

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

7. 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.

8. 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.

***9.* 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.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. The criteria are described in the box above. This section of the Proposed Plan profiles the relative performance of each alternative against seven of the nine criteria, noting how it compares to the other options under consideration. The evaluation criteria are discussed below. A detailed analysis of each alternative can be found in the FS.

Overall Protection of Human Health and the Environment

The No Action Alternatives (GW-1, S-1) for both soil and groundwater are not protective of human health and the environment, because they do not reduce contamination, or include groundwater monitoring to determine the fate and transport of the plume over time and are without any means to evaluate the time until remediation goals are met. Future exposure to soil and groundwater contamination could result in unacceptable and uncontrolled risks to the public.

The remaining two soil alternatives are protective of human health and the environment. Soil Alternative S-2 uses capping to prevent exposure to contaminated soil and S-3 uses excavation and off-site disposal to achieve the same result.

The remaining groundwater alternatives are protective of human health and the environment. Groundwater Alternatives GW-2 through GW-5 have components of natural attenuation with long-term monitoring for groundwater contamination in the distal plume. Alternatives GW-3 through GW-5 include vapor extraction for addressing remaining contamination in the source area vadose zone. GW-4 and GW-5 include additional active treatment of groundwater contamination in the shallow bedrock aquifer.

Because S-1 and GW-1 (No Action) are not protective of human health and the environment, they were eliminated from consideration under the remaining evaluation criteria.

Compliance with ARARs

Actions taken at any Superfund site must meet all ARARs under federal and state laws or provide grounds for invoking a waiver of those requirements.

For soil, the New Jersey residential direct contact soil remediation standard for PCBs is identified as an ARAR, and the PRG for PCBs. Alternatives S-2 and S-3 would meet the chemical-specific ARAR since PCB contaminated soil would be contained or removed from the site. Location-specific and action-specific ARARs would be met by complying with all substantive requirements that apply to the actions, such as handling of remediation waste and storm water management.

EPA and NJDEP have promulgated MCLs, which are enforceable standards for various drinking water contaminants (and are chemical-specific ARARs). If any state standard is more stringent than the federal standard, then compliance with the more stringent ARAR is required. As groundwater within site boundaries is a source of drinking water, the more stringent of the federal MCLs, NJ MCLs, and NJ GWQS are evaluated as ARARs. In GW-2, MNA alone would restore the aquifer to meet ARARs but in an unreasonable time frame (greater than 500 years). All alternatives that involve active groundwater treatment, GW-3, GW-4, and GW-5, would restore the aquifer to cleanup standards in less time than Alternative GW-2. Air treatment for emissions from treatment plants to meet Clean Air Act and applicable NJDEP ARARs may be required for GW-3, GW-4, and GW-5, and could be met.

Long Term Effectiveness and Permanence

Soil Alternative S-2 relies on adequate inspection and maintenance to prevent erosion or damage of the cap from re-exposing contaminated soil, particularly in the steep slope areas. Alternative S-3 would have the least residual risk since all contaminated soil above PRGs would be removed from the site. Control measures would not be necessary for Alternative S-3, indicating that S-3 has greater long-term protectiveness compared to Alternative S-2.

Alternatives GW-2 through GW-5 would all provide long-term effectiveness and permanence to varying degrees. The magnitude of residual risk is greatest for GW-2 since no active removal or destruction of contaminants would occur. GW-2 would rely on the cap to prevent infiltration of rainwater that could mobilize VOC mass stored in the vadose zone. GW-3, capping and vapor extraction, would be next highest in residual risk since active treatment would be limited to the vadose zone. GW-4 and GW-5 would provide a higher degree of long-term effectiveness because groundwater would be treated in addition to the vadose zone.

The adequacy and reliability of the caps for GW-2 through GW-5 would rely on routine inspection and maintenance and the maintenance of the institutional controls. Without adequate inspection and maintenance, erosion or damage to the cap would allow precipitation to enter the vadose zone adding to the mobilization of contaminants in the vadose zone and groundwater. The requirement for maintaining the integrity of caps for GW-2 is the most significant since there would be no additional treatment. The active treatment components (vapor extraction, in situ treatment, and DPE) under GW-3 through GW-5 are reliable technologies. However, the adequacy of controls would need to be determined during the design through PDI and pilot studies since the site has complex geology (e.g., a complicated fracture network with dead-end fractures) and potential non-aqueous phase liquids (NAPLs). Alternative GW-4 provides greater long-term effectiveness compared to Alternative GW-5 because it is expected to result in a greater reduction in contaminant mass migrating from source area bedrock fractures into groundwater, therefore, resulting in restoration of the aquifer in a shorter time frame.

In the FS, a model was used for comparison purposes to estimate the length of time it would take each alternative to restore the aquifer to PRGs. Time estimates would be further refined during the design phase, with additional investigations and pilot testing. Due to the complex geology, Alternatives GW-2, GW-3 and GW-5 are expected to take over 200 years for full restoration of aquifer. In Alternative GW-4 the distal plume aquifer, in the vicinity of the impacted residential wells located downgradient of the source area, is expected to reach PRGs within 30 years and the shallow contaminated bedrock aquifer in the source area within 150 years.

Reduction in Toxicity, Mobility or Volume (TMV) through Treatment

Neither Alternative S-2 nor S-3 reduce toxicity mobility or volume through treatment. Alternative S-2 would reduce the mobility of the contaminants through capping but the toxicity and volume of contamination would not change. Alternative S-3 would reduce the mobility and volume of contamination since all contaminated soil would be transported off-site for disposal.

Capping under Alternatives GW-2 through GW-5 would reduce the infiltration of the rainwater, thereby reducing the mobility of the VOCs in the vadose zone. MNA, vapor extraction, amendment injections, and DPE under alternatives GW-2 through GW-5 are all treatment technologies and all have capability of reducing the toxicity and volume of VOCs. Although implementing any technology in the fractured bedrock geology at the site presents significant challenges, alternative GW-4 would achieve reduction of toxicity and volume the fastest because the transmissive fractures where contamination flux is the greatest could be identified during a pre-design investigation using borehole geophysics and transmissivity testing, and a long-lasting amendment would be injected into these features. Over time, the amendment in the transmissive features would be used to treat contaminant mass moving out of fractures before the contamination has a chance to move downgradient. Pilot testing of the ability to place amendment in the very thin fractures at the site would be needed.

Short Term Effectiveness

Soil Alternatives S-2 and S-3 would both impact local traffic along Brookwood Road during the short-term if equipment requires access through a residential area to implement the work. S-3 would have the greatest requirements for transportation of contaminated materials for off-site disposal, but this could be done via the road along the dump areas rather than on Brookwood Road through the residential community. S-2 would require the largest quantity of import materials; this also could be done from the dump areas. Construction would generate noise and dust during the day, which would be controlled to minimize impact to the residential community. The duration of on-site construction would be longest for S-3, which reflects the most short-term impact to the community. Stormwater management would need to be considered for both S-2 and S-3.

Groundwater Alternative GW-2 would have low to moderate impact in the non-residential area where the remediation would take place due to the construction of the cap and periodic maintenance. GW-3 would have low to moderate impacts similar to GW-2 for the cap and a small area of vapor extraction wells. Alternatives GW-4 and GW-5 would have moderate impacts because of the need for drilling to install and operate the injection (GW-4) or DPE system (GW-5), which would continue for several years. The operation of the vapor extraction system (GW-4) and DPE system (GW-5) is estimated to continue for five years each.

Implementability

Alternative S-3 is implementable because equipment and experienced vendors for excavation and backfilling are readily available. Limited entry to the residential area would make excavation slightly difficult. S-2 has the highest complexity in design, implementation, and long-term monitoring since it involves the design and construction of a cap along a steep slope. The cap installation of over an acre may trigger stormwater management requirements such as installation of a stormwater retention pond. This could be problematic since there is no suitable space for the pond. Additionally, a long-term inspection and maintenance plan would need to be developed for S-2 to maintain the cap to ensure continued protection of human health and the environment. Stormwater management would need to be considered for S-3 but to a lesser extent as excavation would not increase runoff at the residential area as much as capping under S-2 would. There are no O&M requirements under S-3. A deed notice would be required for S-2 to prevent disturbance of the cap; no such deed restriction would be required for S-3.

Of the active alternatives, alternative GW-2 would be the easiest to implement since the capping work would be conducted on the surface, with minimal constructability concerns. GW-3, GW-4, and GW-5 share a common implementability concern due to difficulty of addressing contamination in the fractured rock subsurface: the complexity of the fracture network with variations in transmissivity of fractures means that it would potentially be difficult to effectively identify and target the transmissive fractures for each technology. Alternatives GW-2 through GW-5 may trigger the need to install a stormwater retention pond due to disturbance of ground surface and/or installation of an impermeable cap. The vapor extraction system, in situ treatment, and DPE components of Alternatives GW-3 through GW-5, respectively, are estimated to require operation for five years

In the case of GW-5, given the low storativity of the fractured bedrock aquifer and the observed large fluctuation in the potentiometric surface, it may be difficult to operate a long-term groundwater extraction system effectively in order to extract and treat mass coming out of fractures in the bedrock. In Alternative GW-4, the amendment injected into the saturated zone of bedrock would remain in the subsurface for a longer period of time and therefore have more interaction with contaminants. It is expected that GW-4 would be able to reduce mass migrating from fractures in the bedrock in the source area to a greater degree and faster than GW-5.

Cost

The present-worth costs for all alternatives are calculated using a discount rate of 7 percent. Costs are calculated based on each alternative's estimated timeframes to achieve soil remedial action objectives. The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the following table.

Alternative	Capital Cost	Total Present-Worth Cost
S-1	$0	$0
S-2	$1,796,000	$2,467,000
S-3	$2,399,000	$2,399,000
GW-1	$0	$0
GW-2	$2,167,000	$4,154,000
GW-3	$4,078,000	$6,528,000
GW-4	$6,410,000	$9,106,000
GW-5	$4,837,000	$7,872,000

State/Support Agency Acceptance

EPA's preferred remedy as presented in this Proposed Plan is under review by the State of New Jersey.

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, the document that formalizes the selection of the remedy for the site.

PREFERRED ALTERNATIVE

Soil Remedy

The Preferred Alternative for achieving remedial action objectives for contaminated soil is Alternative S-3, which includes excavation of residual soil contamination in the residential and former dump areas. The exact extent of soil contamination will be determined based on sampling to be performed during the remedial design phase. Limited soil in the former dump areas and a residential area will be excavated and disposed of off-site in an EPA approved RCRA Subtitle D or C facility. The excavations will be backfilled with certified clean fill material. Confirmation sampling will also be conducted to verify the remedy meets PRGs.

Alternative S-3 prevents risks from direct contact to contaminated media, minimizes leaching of contaminants to groundwater, and limits erosion of contaminated soil by excavating contaminated soil above cleanup goals. This alternative will eliminate the need for long-term monitoring or institutional controls and will not limit future use of the areas after completion of the remedial action.

Groundwater Remedy

The Preferred Alternative for achieving remedial action objectives for contaminated groundwater and source area bedrock vadose zone contamination at the Mansfield Trail Dump site is Alternative GW-4. The primary components of Alternative GW-4 are capping and vapor extraction of the source area bedrock vadose zone, in situ treatment of the source area saturated zone through the addition of amendments, and MNA of the distal plume.

The contaminated source area bedrock vadose zone will be capped to reduce infiltration of rainwater, thus limiting the migration of vadose zone contamination into groundwater. Vapor extraction wells will be installed to actively treat any residual contamination in the vadose zone. The cap would also serve as an impermeable barrier to enhance the performance of the SVE system, which is expected to be run for approximately 5 years.

In situ treatment will be conducted to remediate the contaminated groundwater in the source area bedrock zone. Pilot studies would be performed as part of the remedial design phase to determine which amendment would be the most effective for the site contaminants and complex geologic setting. Monitored natural attenuation will be implemented in the distal plume. An extensive monitoring program will be conducted to evaluate groundwater contaminant concentrations over time to ensure that attenuation mechanisms, such as biodegradation, are reducing concentrations at the expected rate.

Institutional controls will be required to prevent the installation of wells within the contaminated groundwater plume, until groundwater is restored to its beneficial use, and a review of the remedy every five years would also be required. Furthermore, potential groundwater users are protected by being provided with a public water supply as part of the OU1 remedy.

As previously stated, implementability concerns due to a fractured rock subsurface will require design phase investigations and pilot studies. EPA will perform preliminary design investigations to further delineate the soil excavation boundaries and the extent of bedrock vadose zone contamination. A pilot study will be performed during the design phase to test amendments and injection techniques in the saturated bedrock aquifer.

Basis for the Remedy Preference

The Preferred Alternatives were selected over the other alternatives because they are expected to achieve substantial and long-term risk reduction through treatment and are protective of human health and the environment. The Preferred Alternative for soil would prevent risks from direct contact to contaminated media and minimize leaching of contaminants to groundwater, and limit erosion of contaminated soil through excavation of contaminated soil above cleanup goals, thereby eliminating the need for long-term monitoring or institutional controls, such that future use of the areas after completion of the remedial action need not be restricted.

The Preferred Alternative for groundwater would reduce risk within a reasonable time frame, as compared to the other groundwater alternatives, with greater long-term effectiveness, reducing mass migrating from fractures in the bedrock in the source area to a greater degree and faster than Alternative GW-5 at a comparable cost, and it will provide a long-term reliable remedy.

Consistent with EPA Region 2's Clean and Green policy, EPA will evaluate the use of sustainable technologies and practices with respect to any remedial alternative selected for the site.

COMMUNITY PARTICIPATION

EPA encourages the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted there. The dates for the public comment period, the date, location and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan. Written comments on the Proposed Plan should be addressed to the Remedial Project Manager, Anne Rosenblatt, at the address provided. EPA Region 2 has designated a public liaison as a point-of-contact for the community concerns and questions about the federal Superfund program in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands. To support this effort, the Agency has established a 24-hour, toll-free number that the public can call to request information.

For further information on Mansfield Trail Dump Superfund site, please contact:

Anne Rosenblatt
Remedial Project Manager
(212) 637-4347
rosenblatt.anne@epa.gov

Patricia Seppi
Community Relations Coordinator
(212) 637-3639
seppi.patricia@epa.gov

Written comments on this Proposed Plan should be addressed to Ms. Rosenblatt.

U.S. EPA Region 2
290 Broadway 19th Floor
New York, New York 10007-1866

The public liaison for EPA Region 2 is:
George H. Zachos Regional Public Liaison
Toll-free (888) 283-7626, or (732) 321-6621

U.S. EPA Region 2
2890 Woodbridge Avenue, MS-211
Edison, New Jersey 08837-3679

FIGURE 1: SITE MAP

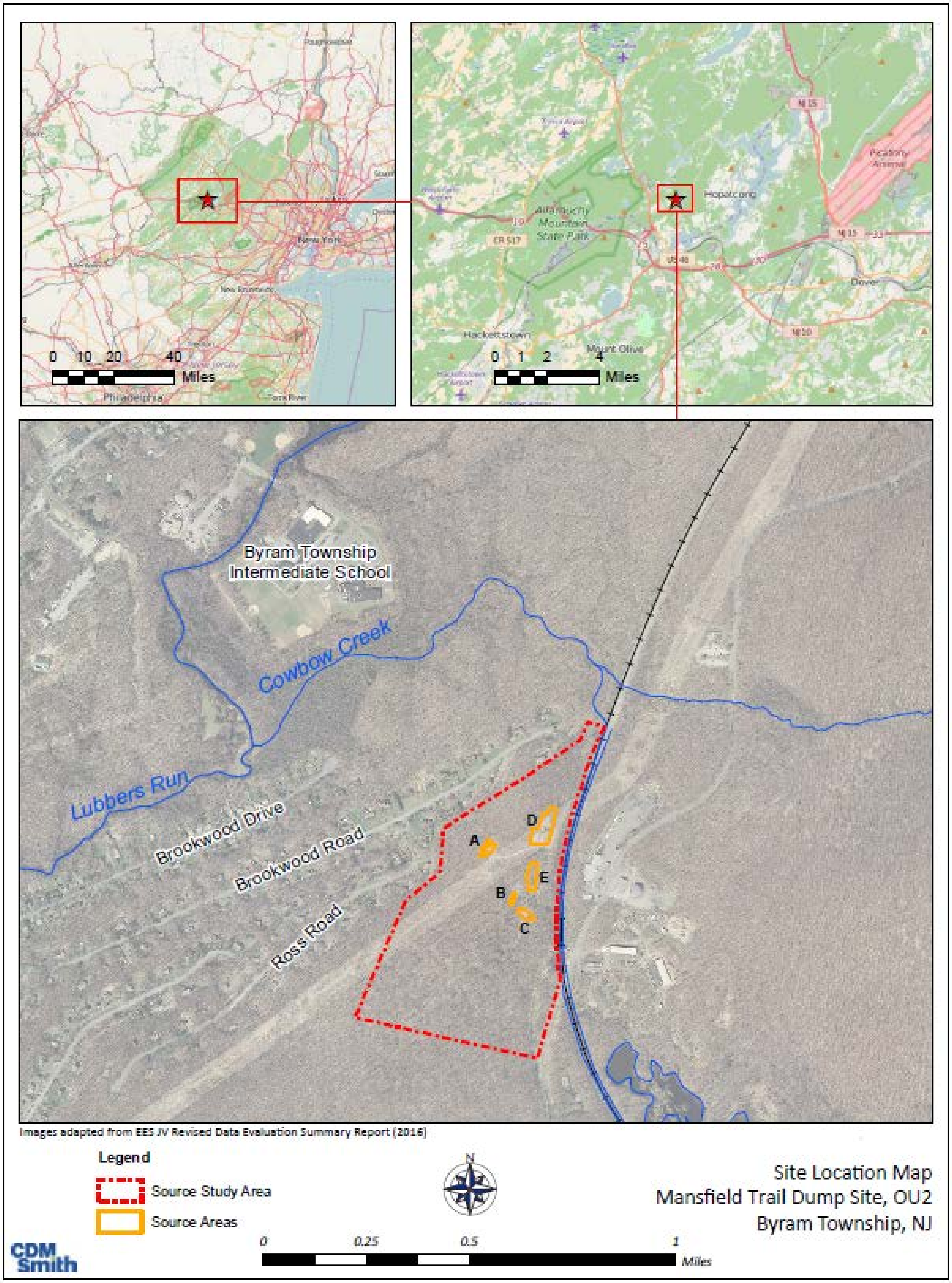

FIGURE 2: SITE PLAN

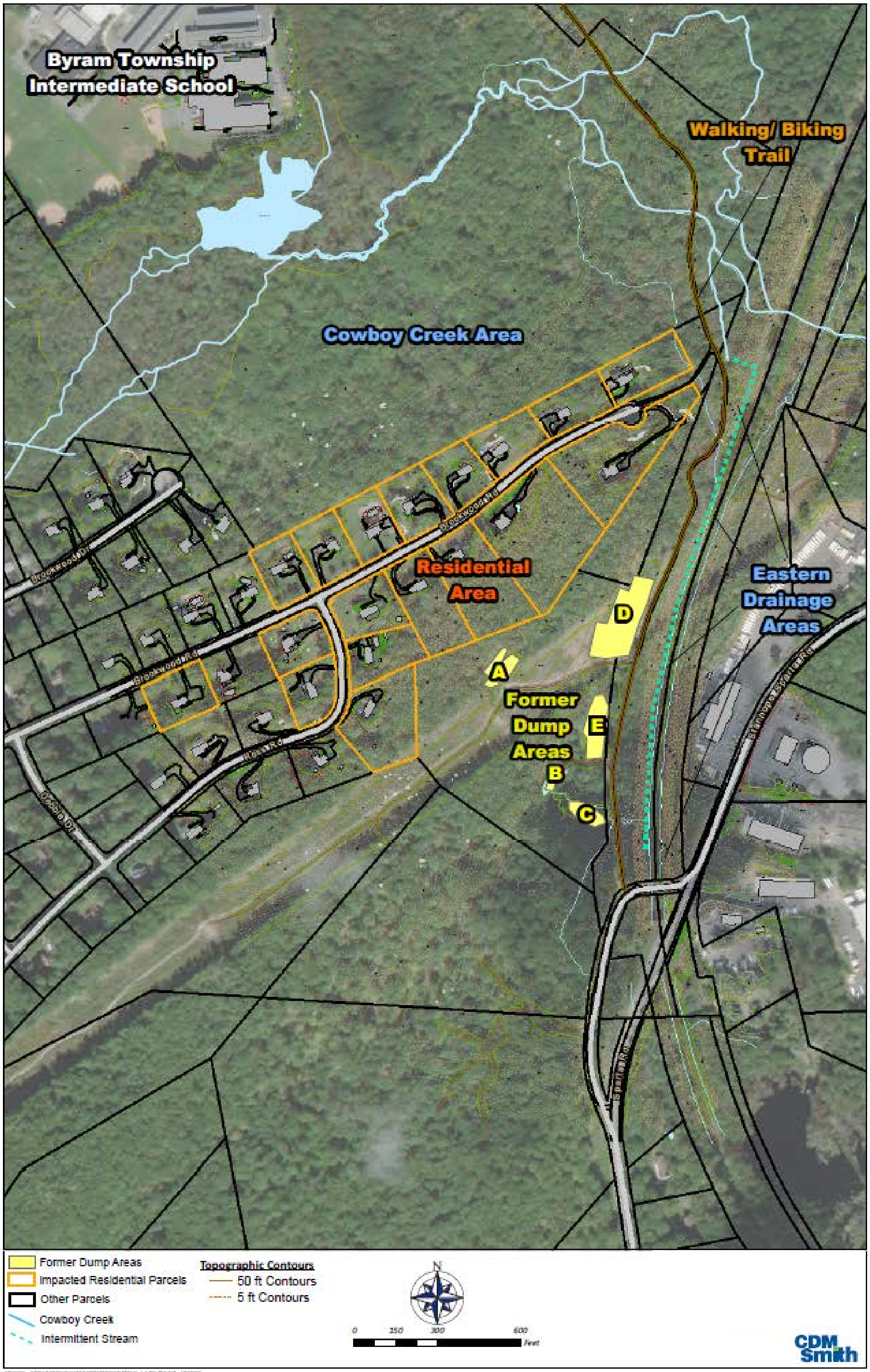

FIGURE 3: MONITORING WELL LOCATIONS

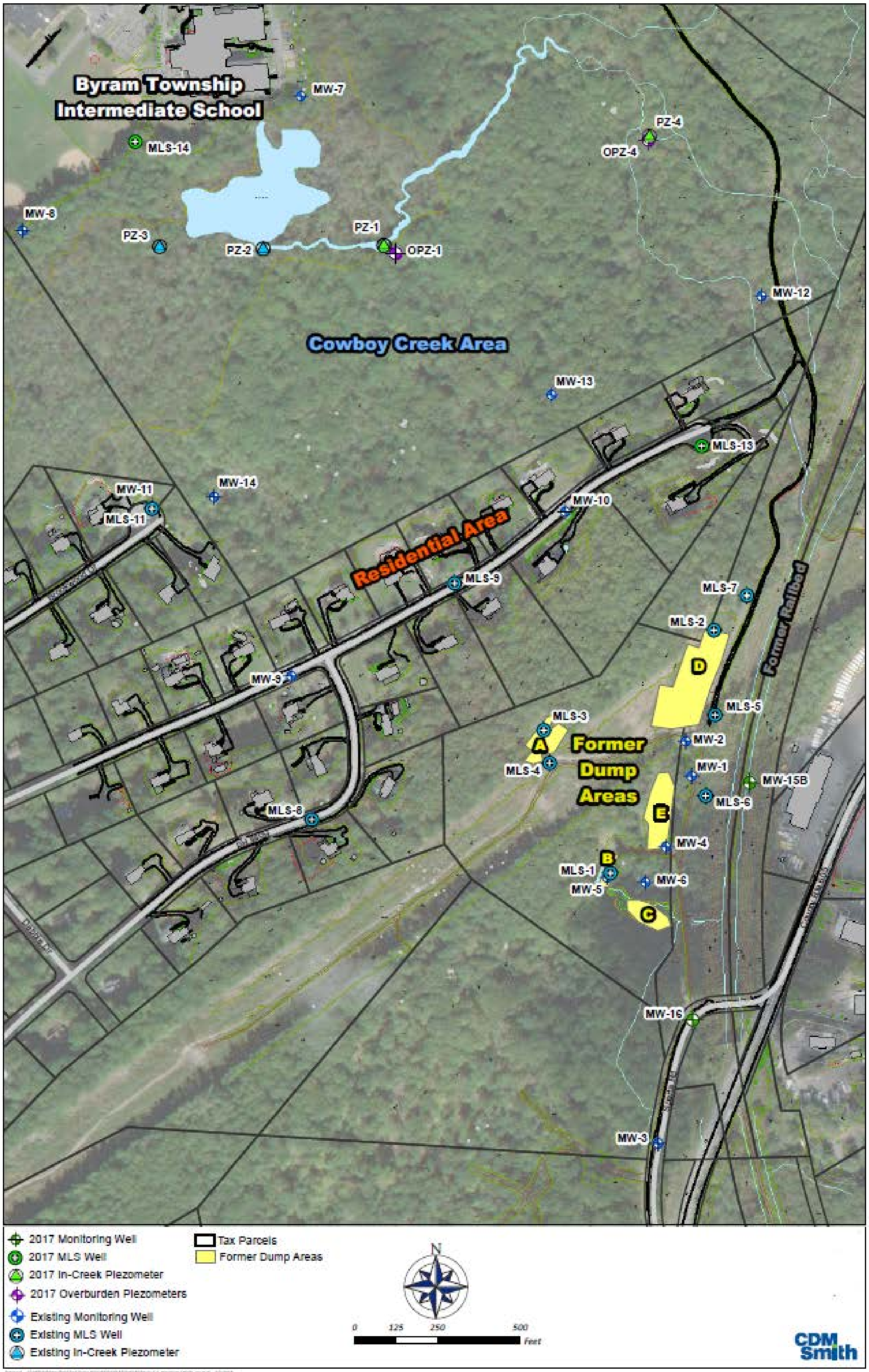

FIGURE 4: PLUME MAP

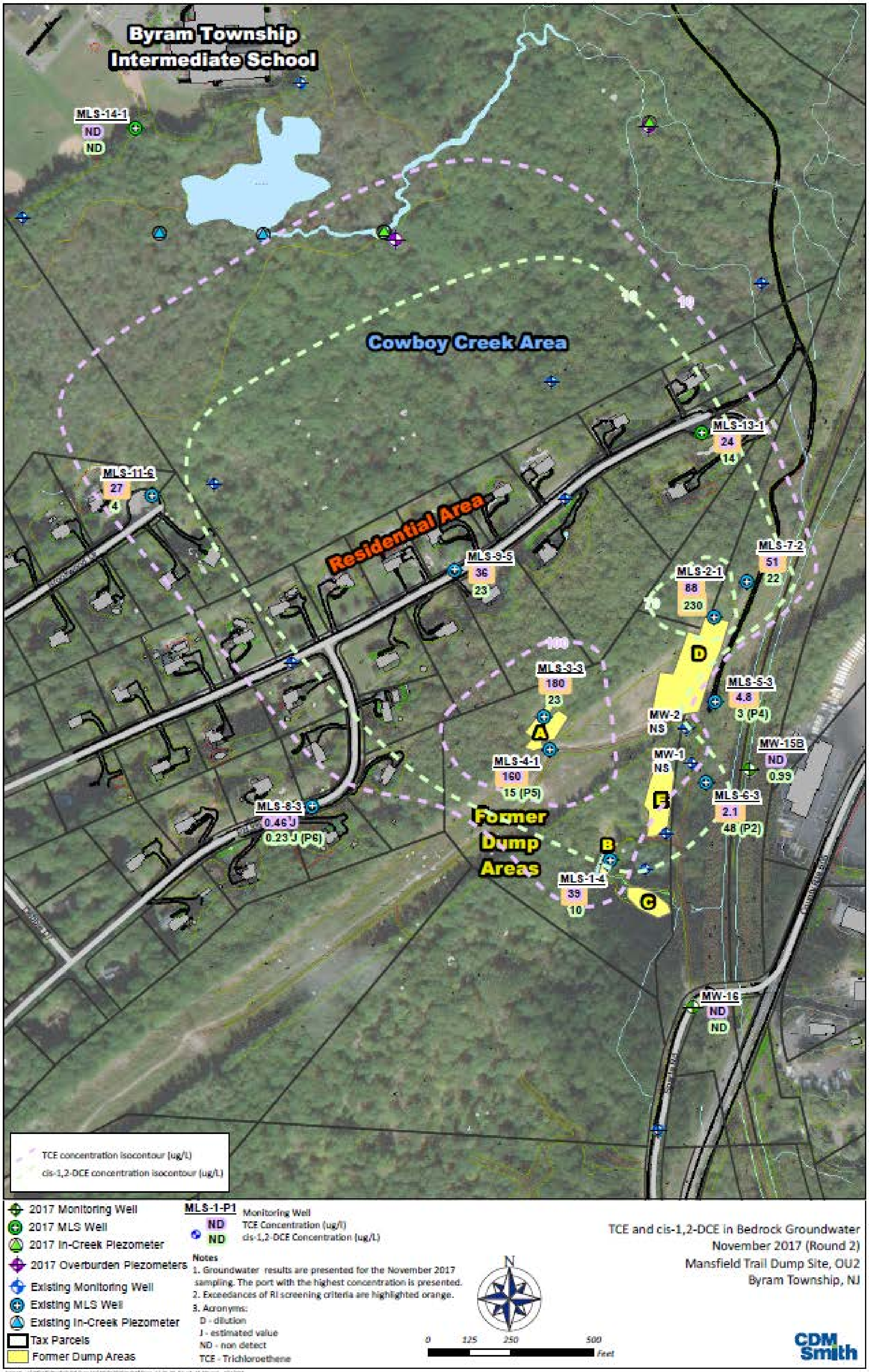

TABLE 1: SOILS PRELIMINARY REMEDIATION GOALS

Chemical Name	Unit	NJDEP Residential Direct Contact Soil Remediation Standards (1)	NJDEP Default Impact to Groundwater Soil Remediation Standards (2)	Background Threshold Value (3)	Preliminary Remediation Goals
Volatile Organic Compounds (VOCs)					
Polychlorinated Biphenyls (PCBs)					
PCBs (4)	mg/kg	0.2	NA	NA	0.2
Inorganics					
Lead (5)	mg/kg	400	NA	155.2	400

Notes:

(1) NJDEP 2012. Residential Direct Contact Health-Based Criteria and Soil Remediation Standards. Last amended September 18, 2017; http://www.nj.gov/dep/rules/rules/njac7_26d.pdf

(2) NJDEP 2008. Guidance Document, Development of Site-Specific Impact to Groundwater Soil Remediation Standards Using the Soil-Water Partition Equation, Version 2.0. November 2013; http://www.nj.gov/dep/srp/guidance/rs/igw_intro.htm

(3) Background threshold values (BTVs) displayed are surface soils BTVs developed by EES JV for SVOCs and metals based on a statistical evaluation of background analytical results using EPA’s ProUCL, version 5.0 and EPA's Technical Guide - Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations, September 2013.

(4) PCBs Maximum Concentrations Observed is based on combined concentrations of detected aroclors at any one location.

(5) EPA Region 2 recently indicated lead concentrations at residential properties (in addition to meeting the 400 mg/kg maximum concentration PRG) shall be subject to meeting a 200 mg/kg property wide average cleanup goal.

mg/kg = milligrams per kilogram

NA = not applicable

NJDEP = New Jersey Department of Environmental Protection

BTV = background threshold value

PRG = preliminary remediation goal

TABLE 2: GROUNDWATER PRELIMINARY REMEDIATION GOALS

Chemical Name	Unit	National Primary Drinking Water Standards (EPA MCLs) [(1)]	NJ Groundwater Quality Standards [(2)]	NJ Drinking Water Standards [(3)]	Preliminary Remediation Goals [(4)]
Volatile Organic Compounds (VOCs)					
1,1,1-Trichloroethane	µg/L	200	30	30	30
1,1-Dichloroethane	µg/L	NL	50	50	50
1,1-Dichloroethene	µg/L	7	1	2	1
1,4-Dioxane	µg/L	NL	0.4	NL	0.4
Chlorobenzene	µg/L	100	50	50	50
cis-1,2-Dichloroethene	µg/L	70	70	70	70
Trichloroethene	µg/L	5	1	1	1
Vinyl Chloride	µg/L	2	1	2	1
Inorganics					
Lead	µg/L	15	5	15	5

Notes:

[(1)] EPA 2009. National Primary Drinking Water Standards (EPA 816-F-09-004, May 2009);
http://water.epa.gov/drink/contaminants/upload/mcl-2.pdf.

[(2)] NJDEP 2010. New Jersey Ground Water Quality Standards Class IIA (N.J.A.C. 7:9C, July 22, 2010, readopted without change on March 4, 2014);
https://www.nj.gov/dep/rules/rules/njac7_9c.pdf.

[(3)] NJDEP 2009. New Jersey Drinking Water Standards (February 10, 2009);
http://www.nj.gov/dep/standards/drinking%20water.pdf.

[(4)] Preliminary Remediation Goals (PRGs) were selected from the lowest of the EPA MCLs, NJ Groundwater Quality Standards, and NJ Drinking Water Standards.

µg/L = micrograms per liter

EPA = United States Environmental Protection Agency

MCL = Maximum Contaminant Level

NJ = New Jersey

NJDEP = New Jersey Department of Environmental Protection

NL = not listed