Olean Well Field Superfund Site
Operable Unit 4
Cattaraugus County, New York

July 2022

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered to address contamination at a portion of the Olean Well Field Superfund Site (Site) in Cattaraugus County, New York, herein identified as Operable Unit (OU) 4, and identifies the preferred remedial alternative with the rationale for this preference. For the purposes of this Proposed Plan, OU4 includes several parcels of land[1] that are impacted by contaminated groundwater including those to the south of property owned by AVX Corporation (AVX)[2] and located at 1695 Seneca Avenue, Olean, New York (AVX Property) and north of East State Street.

This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), the lead agency for the Site, 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 of 1980 (CERCLA, also known as Superfund), 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 contamination for OU4 at the Site and the remedial alternatives summarized in this Proposed Plan are more fully described in the Remedial Investigation (RI) Report, dated July 2022, and the Feasibility Study (FS) Report, dated July 2022, as well as other documents in the Administrative Record file for this remedy. EPA encourages the public to review these documents to gain a more comprehensive understanding of the Site, the Superfund activities that have been conducted, and the remedial alternative that is being proposed.

The purpose of this Proposed Plan is to inform the public of EPA's preferred remedy and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred remedy.

The preferred remedy includes the in-situ treatment of contaminated groundwater by chemical/biological remediation (Alternative 5). The preferred remedy also includes long-term performance monitoring and institutional controls.

Changes to the preferred remedy, or a change from the preferred remedy to another remedial alternative described in this Proposed Plan, 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. For this reason, EPA is soliciting public comments on all of the alternatives considered in the Proposed Plan and on the detailed analysis section of the FS Report because EPA may select an alternative other than the preferred alternative.

MARK YOUR CALENDAR
PUBLIC COMMENT PERIOD:

July 15, 2022 to August 15, 2022
EPA will accept written comments on the Proposed Plan during the public comment period.

IN PERSON PUBLIC MEETING:
July 27, 2022 at 6:00 pm
TECH Building, Mangano Reception Room, near the Cutco Theater, 305 North Barry Street, Cattaraugus County Campus of Jamestown Community College, Olean NY

COMMUNITY ROLE IN SELECTION PROCESS

[1] The impacted parcels of land are identified on the City of Olean tax map, and referred to in the OU4 RI Report, as Section 94.076-1, Block 3, Lot 46 (former Dal-Tile property), Lot 47.2 (Independent Auto Dealership), Lots 47.1, 47.3, 47.4, and 47.5 (four private residences), Lot 48 (former Weller property), and Lot 49 (Mastel Ford Dealership property).

[2] In 2020 AVX Corporation became a wholly owned subsidiary of Kyocera Corporation. In 2021 AVX Corporation's name changed to Kyocera AVX Components Corporation or KAVX. The owner of record of the property is still AVX.

EPA relies 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, this Proposed Plan has been made available to the public for a public comment period which begins on July 15, 2022 and concludes on August 15, 2022.

A public meeting will be held on July 27, 2022 to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred alternative, and to receive public comments.

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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Western New York Remediation Section
U.S. Environmental Protection Agency
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New York, New York 10007-1866
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INFORMATION REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories. However, given the disruptions caused by the COVID-19 pandemic, in-person access to the EPA Region 2 Superfund Records Center and the Olean Public Library may be limited. EPA recommends contacting the Records Center to discuss options before visiting either location.

Olean Public Library, located at Second and Laurens Streets Olean, New York
(716) 372-0200
Hours: Monday – Thursday, 9:00 AM – 9:00 PM
Friday and Saturday, 9:00 AM – 5:00 PM

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

EPA's website for the Olean Well Field Site:
www.epa.gov/superfund/olean-wellfield

SCOPE AND ROLE OF ACTION

Site remediation activities are sometimes segregated into different phases, or operable units (OUs), so that remediation of different, discrete environmental media or geographic areas of a site can proceed separately, whether sequentially or concurrently. EPA has designated five OUs for the Olean Well Field Site (refer to Figure 2).

On September 24, 1985, EPA signed a ROD for OU1, which called for, among other things, the treatment of the municipal supply well water and the extension of the public water supply to residents utilizing private wells.

On September 30, 1996, EPA signed a ROD for OU2. The four source areas targeted in the OU2 ROD were as follows: AVX Corporation (AVX) (currently owned by KYOCERA AVX Components Corporation ("KAVX") located at 1695 Seneca Avenue, Olean, New York); Alcas Cutlery Corporation (Alcas) (currently owned and operated by Cutco Corporation and located at 1116 East State Street, Olean, New York); Loohn's Dry Cleaners and Launderers (Loohns) (currently a vacant lot located at 1713 East State Street, Olean, New York); and McGraw-Edison Company (McGraw) (currently operated by Cooper Power Systems, LLC, owned by Cooper Power Systems, Inc., and located at 1648 Dugan Road, Olean, New York). On September 30, 2014, EPA amended the OU2 ROD to modify the selected remedy for the Alcas component of the OU2 ROD. The Alcas OU2 ROD Amendment addressed soil and groundwater contamination impacting the underlying aquifers, and also selected a remedy to address OU3 groundwater contamination. OU3 addresses groundwater contamination at an area south of the Alcas facility referred to as Parcel B.

On September 30, 2015, EPA amended the OU2 ROD to modify the selected remedy for the AVX component of the OU2 ROD. The AVX ROD Amendment selected an interim action to address soil and groundwater contamination impacting the underlying aquifers until a final remedy for the AVX Property is implemented. The AVX ROD Amendment indicated that a change in the current use of the building in the future would trigger the performance of a feasibility study to evaluate source control and/or restoration actions, leading to the selection of a final remedy.

In April 2018, AVX informed EPA that it intended to cease operations at its Olean Manufacturing facility. After cessation of operations, the building was demolished and AVX submitted a work plan to EPA to perform a focused FS to evaluate remedial alternatives for contaminated soils beneath the building slab. The FS is under way and EPA has identified this component of the Site as OU5.

OU4 addresses volatile organic contaminants (VOCs) in groundwater located downgradient of the AVX Property and south of the Conrail railroad tracks. This Proposed Plan concerns OU4 and addresses groundwater contamination at certain residential and commercial properties to the south of the AVX Property.

SITE BACKGROUND

The Site is located in the eastern portion of the City of Olean and western and northwestern portions of the towns of Olean and Portville in Cattaraugus County, New York. The Site is characterized by contaminated groundwater underlying the City of Olean, the Town of Olean and the Town of Portville, and by contaminated soil at certain locations in the City and Town of Olean. The Site is approximately 65 miles southeast of Buffalo, New York, and seven miles north of the New York/Pennsylvania border. The Allegheny River, a principal tributary of the Ohio River, and two of its tributaries, the Olean and Haskell Creeks, flow west-northwest through the southern portion of the Site. A Site location map is provided as Figure 1.

Three municipal water supply wells (18M, 37M and 38M) at the Site were constructed and completed in the late 1970s to provide water for the City and the Town of Olean, New York (see Figure 1). The supply wells draw water from the City Aquifer. Prior to the construction of these municipal wells, city water was supplied by a surface water treatment facility which drew water from the Olean Creek. In 1981, these supply wells were found to contain trichloroethene (TCE) and other VOCs at concentrations exceeding the then New York State Department of Health (NYSDOH) Drinking Water Standards. As a result, these wells were closed and the surface water treatment facility operations were reactivated to provide water to residents.

EPA subsequently evaluated the Site for inclusion on the National Priorities List (NPL) of known or threatened releases of hazardous substances. As a result of this evaluation, the Site was included on the National Interim Priorities List, by publication in the Federal Register on October 23, 1981, and was included on the first NPL on September 9, 1983. Between 1981 and 1985, several separate federal-, state- and PRP-led (Potentially Responsible Party) investigations were conducted to identify the sources of contamination to the municipal wells and evaluate the nature and extent of groundwater contamination at the Site.

Following the discovery by the Cattaraugus County Department of Health and the NYSDOH that a number of private wells in the City and Town of Olean, all of which received groundwater from the area of the groundwater referred to as the upper aquifer (see Site Geology and Hydrogeology section below for additional detail), were also contaminated with TCE, EPA performed an initial removal action in January 1982. This action involved the installation of carbon adsorption filters on 16 contaminated private wells in the City and Town of Olean and periodic monitoring of those wells. In June 1984, EPA conducted a second removal action which included the replacement of one of the carbon filters installed as part of the initial removal action, installation of carbon units on ten additional contaminated private wells, and monitoring. In March 1985, EPA conducted a third removal action which consisted of the installation of carbon filter systems on two additional homes.

The results of the various investigations were documented in the ROD for OU1 issued by EPA on September 24, 1985. The ROD for OU1 called for the following: 1) installation of an air stripper to treat the contaminated groundwater from municipal water supply wells 18M, 37M and 38M; 2) extension of the City of Olean's public water supply line into the Town of Olean to connect approximately 93 residences served by private wells; 3) inspection of an industrial sewer; 4) recommendations for institutional controls to restrict the withdrawal of contaminated groundwater; 5) institution of a Site Monitoring Plan; and 6) performance of a supplemental RI/FS to evaluate source control measures at all facilities that were contributing to the groundwater contamination.

On February 7, 1986, EPA issued an administrative order unilaterally under Section 106(a) of CERCLA, 42 U.S.C. §9606, (OU1 UAO) to AVX, McGraw-Edison Company, Cooper Industries, Inc. (parent corporation of McGraw Edison Company), Alcas, Aluminum Company of America (which at the time owned a percentage share of Alcas), and W.R. Case and Sons Cutlery Company (Case) (which at the time owned the remaining percentage share of Alcas), requiring them to implement the remedy selected in the OU1 ROD. All of the PRPs, with the exception of Case, performed the actions pursuant to the OU1 UAO. Case subsequently filed for bankruptcy. The trustee in that bankruptcy entered into a consent decree with the United States which required the bankruptcy estate to pay a portion of EPA's past costs and a penalty for Case's failure to comply with the OU1 UAO.

Pursuant to the OU1 UAO, the extension of the City of Olean's water line was completed in 1988. In 1989, the private well users were connected to the water line extension. Although residents impacted by the Site were offered connection to the public water supply pursuant to the OU1 ROD, to date, some residents continue to use private wells as a source of potable water. Also in 1989, the industrial sewer at the McGraw property was inspected and repaired. In February 1990, construction of the air strippers was completed and the municipal well water supply service was reactivated. Since the air strippers began operating, sampling indicates that the system effectively removes site contaminants from the groundwater pumped from the City Aquifer to meet State and Federal drinking water standards prior to distribution to the public. On November 13, 1989, EPA issued an additional administrative order to Alcas. The order required Alcas to excavate approximately 10 cubic yards of contaminated soil from an area at the Alcas property where TCE had previously been used as a weed killer. This work was completed in 1989.

On June 25, 1991, an administrative order on consent was entered into between EPA and AVX, McGraw-Edison, Cooper Industries, Alcas and Alcoa Inc., (formerly Aluminum Company of America) for performance of a supplemental RI/FS. The supplemental RI/FS was a mixed work project. Pursuant to this administrative order, the PRPs were required to investigate their respective properties. In addition, EPA conducted studies on 10 additional properties. The results from the investigations conducted by EPA were provided to the PRPs for incorporation into the supplemental RI/FS. In addition to the AVX, Alcas and McGraw-Edison properties, the supplemental RI/FS identified the Loohns property as an additional source area. Based on the results of the supplemental RI/FS, EPA issued a ROD for OU2 on September 30, 1996 to address soil and groundwater contamination at these four properties.

On March 17, 1998, three consent decrees were entered by the United States District Court for the Western District of New York. The Consent Decrees required McGraw Edison and Cooper Industries, Alcas and Alcoa, and AVX to perform the remedies for their respective source areas as specified in the OU2 ROD. The following is a summary of the remediation status at each of the four source areas:

McGraw-Edison - Cooper Industries: Construction of a groundwater pump and treat system for the contaminated upper groundwater aquifer at the McGraw property was initiated in 1999. The groundwater treatment system has been in operation since July 2001.

Loohns Dry Cleaners and Launderers: In the absence of a viable PRP, EPA funded the implementation of the components of the selected remedy at the Loohns property. A remedial design study was completed in 1998 by EPA and based on this study, EPA elected to implement the soil excavation option of the selected OU2 remedy in lieu of vacuum enhanced recovery (VER) or soil vapor extraction/air sparging (SVE/AS). In 2000, EPA initiated the soil excavation activities and approximately 3,000 cubic yards of soil contaminated with tetrachloroethylene (PCE) and other VOCs were excavated and disposed of off-Site. After soil excavation activities commenced, additional data collected at the property revealed that the quantity of soil requiring excavation significantly exceeded the estimated design quantity. As a result, an additional 4,000 cubic yards of contaminated soil was excavated and, along with the debris from the demolished remains of an old building on the property, disposed of off-Site. EPA has conducted periodic monitoring of the groundwater at the Loohns property since 2004.

Alcas: In 1999, the PRPs associated with the Alcas property initiated a series of property-specific pre-design investigations that involved further characterization studies necessary to design the VER component of the selected remedy. Based upon the initial results of these studies, the PRPs determined that geological conditions in the Till Unit (see Site Geology and Hydrogeology section below for additional detail) are heterogeneous and also that the source of groundwater contamination was not from the shallow soil at the rear of the property as identified in the OU2 ROD, but rather the data suggested that the main source of contamination was beneath the main manufacturing building. Based on this new information, Alcas conducted further investigations in 2001 to support its belief that a residual dense non-aqueous phase liquid (DNAPL) source is located at the property under the main manufacturing building. On September 30, 2014, EPA issued an OU2 ROD Amendment as well as an OU3 ROD covering Parcel B, an area of contamination downgradient of the Alcas property. The OU2 ROD Amendment selected in-situ chemical oxidation (ISCO) using persulfate and excavation of certain contaminated soils at the Alcas property and enhanced in-situ anaerobic bioremediation (EAB) at Parcel B, with institutional controls. Implementation of this remedy began in 2020.

AVX: AVX initiated the excavation of contaminated soil at its property in July 2000. Approximately 5,055 tons of contaminated soil was excavated to a depth of approximately 10 feet below ground surface (bgs) and transported off-Site for disposal before work was halted. AVX could not excavate all of the contaminated soils because the material extended beyond the area identified as contaminated in the OU2 ROD to beneath the southeast corner of the manufacturing building, which was fully occupied with AVX's manufacturing operations. Further excavation had the potential to impact the structural integrity of the occupied building. As a result, the excavation area was backfilled pending further study. Further evaluations, discussed below, revealed significant unknown contamination extending under the building and that additional excavation and removal of all contaminated soil would result in significant disruption to and/or shutdown of the on-going operations.

Following the backfilling at the AVX Property, EPA directed AVX to conduct soil and groundwater sampling activities at the AVX Property and properties to the south as part of a multi-phase investigation to assess the conditions at these properties. Results from these studies indicated that significant previously unknown VOC contamination is present in both soil and groundwater.

On September 30, 2015, EPA issued a ROD Amendment for OU2 relating to the AVX Property that addressed soil and groundwater contamination in the Historical Source Area[3] and groundwater contamination in the Downgradient Till Unit and City Aquifer (see Site Geology and Hydrogeology section below for additional detail). In August 2021, AVX completed the remedial design for the selected remedy. Implementation of the selected remedy for the AVX Property is underway. In 2018, AVX closed its facility and demolished the building. Consequently, AVX commenced a focused feasibility study to address the contamination under the building slab (OU5) as contemplated in the 2015 OU2 ROD Amendment, and this work is ongoing.

Site Geology and Hydrogeology

The Olean Well Field is underlain by approximately 300 feet of unconsolidated glacial deposits. Previous groundwater investigations in the Olean Well Field have shown that the upper 100 feet of glacial deposits can be divided into five lithologic units based on color, texture, grain size and mode of deposition. These lithologic units have been grouped in topographically descending order into four hydrogeologic units referred to as the upper aquifer, upper aquitard (Till Unit), lower aquifer (City Aquifer), and lower aquitard.

The upper aquifer is comprised of glaciofluvial coarse sands and sandy gravels, recent fluvial deposits of fine sands, and silts with some clay. The upper aquifer is not continuous at the Olean Well Field Site. The thickest portion of the upper aquifer (approximately 41 feet) is found along the Allegheny River. The upper aquifer thins to the north, pinching out just north of the OU4 study area, near the northern extent of the undeveloped area that is found south of the former manufacturing building on the AVX Property. The upper aquifer is recharged by the infiltration of precipitation.

During the OU4 RI, groundwater in the upper aquifer was encountered at depths ranging from three feet bgs (below ground surface) to more than 20 feet bgs and flow is generally toward the Allegheny River. North of the railroad tracks (on the AVX Property), groundwater flow is in a south to southeast direction in much of the undeveloped portion of the AVX Property with some components of flow towards the surface drainage swale that runs toward the unnamed stream. South of the railroad tracks, the unnamed stream acts as a groundwater divide. Groundwater east of the stream generally flows in a south-southwest direction, while groundwater to the west of the stream generally flows in a southeast direction.

The upper aquitard or Till Unit stratigraphically is located above the lower aquifer (referred to as the City Aquifer). This unit is a low-permeability lodgement till composed of greater than 50 percent silt and clay. This unit is heterogeneous and can contain some sandier layers that generally have limited lateral extents. The thickness of the Till Unit at the Olean Well Field Site ranges from as little as six feet in the south to over 30 feet in the north, near the AVX Property. On the far western and far eastern portions of OU4, the Till Unit was observed within five feet of the ground surface.

The City Aquifer consists of glacial outwash deposits of sand, silt, and gravel. The top of the City Aquifer within the OU4 study area was encountered at depths between 34 and 41 feet bgs. The thickness of the City Aquifer is approximately 70 feet in the northern portion of the Site and thins to approximately 30 feet south of the Allegheny River. The City Aquifer is underlain by the lower aquitard, which has been described as silt, clay, and fine to very fine sand, and was likely deposited in a pre-glacial lake environment. Regional groundwater level data and potentiometric surface maps indicate that lines of equal elevation for the upper aquifer generally parallel the Allegheny River. This indicates that groundwater flow is towards the river from both sides of the river valley.

The City Aquifer is the main source of drinking water for the City and Town of Olean. In addition, several industrial facilities in the area utilize wells completed in the City Aquifer for manufacturing activities. The regional groundwater flow within the City Aquifer is generally in a west-southwest direction. Recharge to the City Aquifer is via leakage from the upper aquifer through the upper aquitard or directly through the Till Unit (upper aquitard) where the upper aquifer is not present. The magnitude of

[3] The Historical Source Area generally consists of soil contamination and groundwater contamination in the Till Unit beneath the manufacturing building and the land at the southeast corner of the building immediately proximate thereto, including the shallow north-south trending drainage swale that begins to the south of the building.

leakage over the Olean Well Field Site is variable and is dependent on the thickness and permeability of the upper aquitard (Till Unit) and relative groundwater level differences between the upper aquifer and upper aquitard units and the City Aquifer. Natural flow conditions in the City Aquifer within the vicinity of the Site have been altered by the pumping of the municipal wells, in operation since 1985, and several industrial wells including an AVX production well, in operation since 1959. Pumping of the AVX production well is a component of the selected OU2 amended remedy for the AVX Property and therefore continues to operate even though the plant closed down.

Several types of artificial fill were observed throughout OU4, except in the floodplain of the unnamed stream. Some of the fill contained topsoil, as well as man-made materials such as fragments of ceramic tile, brick, glass, metal, and plastic. Steep slopes east and west of the unnamed stream from four to ten feet in height indicate some areas of OU4 have been built up from their natural undeveloped pre-existing land surface.

The Alleghany River is the major drainage feature in Olean. Two major creeks, Olean Creek and Haskell Creek, discharge into the Alleghany River in Olean. The OU4 study area is located between Olean and Haskell Creeks and is bisected by an unnamed stream that originates to the north of OU4 and flows south, emptying into the Alleghany River. The unnamed stream accepts discharge water from the AVX production well, which continues to pump and extract groundwater as part of the selected remedy pursuant to the 2015 ROD Amendment for OU2 at the AVX Property.

RESULTS OF THE OU4 REMEDIAL INVESTIGATION

In an effort to further define the extent of contamination near the southern boundary of the AVX Property, in 2008 soil and groundwater samples were collected by AVX from two parcels (former Weller and Mastel Ford Dealership properties) on the southern side of the railroad tracks. The Mastel Ford Dealership was previously investigated by EPA as part of the 1991 OU2 supplemental RI/FS referred to above, and was not identified as a source of groundwater contamination.

In 2007, direct-push technology (DPT) was used to install 23 borings to depths of approximately 30 feet bgs to collect soil and groundwater samples. Data collected from these borings was used to identify the locations for the installation of three permanent groundwater monitoring wells in 2008. Elevated levels of TCE, *cis*-1,2-DCE, and other VOCs were observed in DPT groundwater samples. Although the soil gas data collected as part of the OU2 1991 Supplemental RI/FS revealed the presence of PCE, sampling conducted during the installation of permanent groundwater monitoring wells did not detect the presence of VOCs in soil.

In 2015, EPA commenced an RI/FS for OU4. Phase I of the OU4 RI, conducted in 2016, consisted of the installation of 192 soil borings and the collection of 389 soil samples using DPT to identify and delineate potential VOC source areas. The program consisted of 15 transect lines trending generally east-west in orientation. TCE was detected in soils at a maximum concentration of 550 parts per million (ppm). PCE was detected in soils at a maximum concentration of 8.9 ppm. Based on the depth to the water table and the fact that the samples revealing elevated concentrations were collected below the water table, the soil contamination is due to contact with contaminated groundwater. Other contaminants detected in soil samples included, but were not limited to, *cis*-1,2-DCE, *trans*-1,2-DCE, vinyl chloride, and benzene. No soil samples collected from the unsaturated zone (i.e., above the water table) contained VOCs at concentrations that indicate the presence of a contaminant source. Groundwater samples were collected at locations with sufficient groundwater, resulting in the collection of 173 groundwater samples for analysis. Groundwater samples revealed elevated levels of VOCs, including TCE at a maximum concentration of 28,000 parts per billion (ppb) and *cis*-1,2-DCE at a maximum concentration of 6,000 ppb. Other contaminants detected in groundwater samples included, but were not limited to, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, 1,4-dioxane, vinyl chloride and chloroethane.

In July 2016, surface water and sediment samples were collected from 10 locations along the unnamed stream that runs along the west side of the Mastel Ford Dealership property. PCE, TCE, *cis*-1,2-DCE, 1,1-dichloroethene, and 1,1,1-TCA were detected at low concentrations with concentrations generally decreasing from upstream to downstream. No VOCs were detected in sediment samples. The soil and surface water results are summarized in Table 1.

Based on the results of the Phase I investigation, in 2017, 12 shallow groundwater monitoring wells with depths up to 25 feet bgs and five deep monitoring wells with depths greater than 30 feet bgs were installed as part of Phase II. Twelve soil samples were collected for analysis during the installation of the shallow groundwater monitoring wells. The soil sampling did not reveal any source of VOCs in soil.

Two rounds of groundwater samples were collected in 2017 from the 12 shallow and five deep groundwater monitoring wells, and from six groundwater monitoring wells located on the AVX Property. A third round of groundwater sampling was conducted in 2019 that included monitoring wells that existed prior to the OU4 RI, consisting of a total of 33 permanent groundwater monitoring wells. VOC results are summarized in Table 2 below. The highest concentration of TCE in groundwater (28,000 ppb) was detected in soil boring T04-R04, from 18 to 19 feet bgs, in the vicinity of well AVX-24S, on the northeastern corner of the former Weller property. In addition to VOCs, metals (arsenic, iron and manganese) were detected in the groundwater sampling results. The presence of elevated metals in groundwater, however, is unrelated to the Site.

Table 1: Maximum Soil and Surface Water Contaminant Concentrations

Contaminant	Soil (ppm)	Surface Water (ppb)
TCE	550	5.4
cis-1,2-DCE	6.8	1.1
vinyl chloride	.79	1.9U
1,4-dioxane	.017	1.8
PCE	8.9	3.3

*U = Not detected (method detection limit shown)

Table 2: Maximum Groundwater Contaminant Concentrations

Contaminant	Groundwater DPT (ppb)	Groundwater Permanent Wells (ppb)
TCE	28,000	20,000
cis-1,2-DCE	6,000	7,000
vinyl chloride	600	1,100
1,4-dioxane	N/A*	440
PCE	31	20

*1,4-dioxane not a sampling parameter as part of the DPT program

An evaluation of natural attenuation conditions was conducted as part of the RI. Overall, the analyses indicated that some level of natural attenuation of Site-related contaminants is occurring. Groundwater samples revealed an increase in concentration of daughter products (e.g., *cis*-1,2-DCE and vinyl chloride) relative to the concentration of the parent compound (e.g., TCE). Reductive dechlorination is a natural attenuation process that can degrade chlorinated VOCs by transforming chlorinated compounds such as TCE to other compounds. Other natural attenuation processes can include dispersion, dilution, sorption, volatilization. The primary process of attenuation at a site can change through time if subsurface chemical conditions are altered. The observed concentrations of contaminants within the OU4 study area suggest that some level of natural attenuation is occurring. To assess degradation processes on Site-related contamination, groundwater samples collected in June 2019 were also analyzed for additional parameters to provide information on geochemical conditions, which can impact natural attenuation processes. The following is a summary of the analysis.

- Reductive dechlorination only occurs in anaerobic conditions (less than 0.5 mg/L of dissolved oxygen (DO)). DO levels measured at OU4 of the Site showed that a majority of the shallow monitoring wells yielded DO concentrations below 0.5 mg/L, indicating anaerobic conditions.
- The presence of ferrous iron and methane suggests reducing conditions to promote reductive dechlorination, which is conducive to natural attenuation. Analyses revealed the presence of ferrous iron and methane indicating that anaerobic metabolism is occurring in portions of the study area.
- The depletion of sulfate also suggests the occurrence of active anaerobic metabolism. Sulfate levels indicated a moderate potential for natural attenuation in localized portions of the study area.
- Chloride is produced during reductive dechlorination. A comparison of data collected from nearby groundwater monitoring wells screened in the City Aquifer to shallower monitoring wells within the study area reveal an increase in chloride levels within a portion of the study area, indicating that reductive dechlorination may occur.
- Ethene and ethane are final end-products of reductive dechlorination. These compounds were detected in several monitoring wells within the study area, indicating that some degree of natural attenuation of Site-related contaminants is occurring.

However, analyses of other parameters indicative of favorable conditions for natural attenuation did not provide strong support. These parameters included dissolved organic carbon and nitrate concentrations, as well as readings of oxidation-reduction potential.

The OU4 RI Report contains additional details for all sampling results, including an in-depth analysis of the natural attenuation evaluation that can be found in Appendix L of the RI Report.

Based on the OU4 RI, a major source of the groundwater contamination at OU4 of the Site is the AVX Property. Figure 2 shows the approximate boundaries of OU4.

Principal Threat Waste

Principal threat wastes are considered source materials, i.e., materials that include or contain hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or as a source for direct exposure. Contaminated groundwater is generally not considered to be source material. Please refer to the text box entitled, "What is a Principal Threat" for more information on the principal threat concept.

WHAT IS A "PRINCIPAL THREAT"?

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those 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. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

RISK SUMMARY

As part of the RI/FS, a baseline human health risk assessment (HHRA) and screening level ecological risk assessment (SLERA) were conducted to estimate the risks and hazards associated with 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 caused by hazardous substance exposure in the absence of any actions to control or mitigate these exposures under current and future site uses.

In the HHRA, cancer risk and noncancer health hazard estimates are based on current reasonable maximum exposure (RME) scenarios. The estimates were developed by taking into account various health protective estimates about the concentrations, frequency and duration of an individual's exposure to chemicals selected as contaminants of potential concerns (COPCs), as well as the toxicity of these contaminants.

Human Health Risk Assessment

A four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of Hazard Identification, Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Human Health Risk and How is it Calculated").

The HHRA began with selecting contaminants of potential concern (COPCs) in various media (i.e., surface soil (0-2 feet), subsurface soil (2-10 feet), sediment, surface water, and groundwater) that could potentially cause adverse effects in exposed populations. COPCs were selected by comparing the maximum detected concentrations of the chemicals identified with state and federal risk-based screening values. The screening of each COPC was conducted separately for each exposure area.

OU4 of the Site includes a mix of residential and commercial zoning. EPA expects that the land-use pattern at and surrounding OU4 of the Site will not change in the foreseeable future. For purposes of the HHRA, OU4 of the Site was divided into four separate exposure areas. Exposure areas are geographic designations created for the risk assessment to define areas with similar anticipated current and future land use or similar levels of contamination. Those evaluated in the HHRA include the Former Weller property, Mastel Ford Dealership property, Independent Auto Dealership property and the unnamed stream. Some pathways were also evaluated for the entire OU. It was assumed that exposure to groundwater would occur on an OU-wide basis or that redevelopment could occur resulting in one large contiguous soil exposure area for construction workers. Three private residences and a large area of vacant land (i.e., the former Dal-Tile property) are also included in the OU4 footprint. However, sampling performed during the RI did not indicate the presence of VOCs on these properties. Therefore, they were not recognized as being significant exposure pathways and were not included in the HHRA.

Potential Exposure Pathways

The Former Weller property contains two occupied residential buildings toward the southern end of the property and one unoccupied outbuilding located toward the northern end of the property. The Mastel Ford Dealership property is an auto dealership that includes a showroom and service department. The Independent Auto Dealership property is located between the Former Weller property and the private residences within OU4. The unnamed stream is a shallow, narrow surface water feature with steep slopes ranging from four to ten feet that runs along the western end of the Mastel Ford Dealership property. Impacted groundwater below OU4 of the Site was treated as a separate exposure as well, however, all residents are currently connected to a public drinking water supply. As such, the following current and future receptor populations and routes of exposure were considered at the site:

- Recreational User (adolescent [7 to 18 years]): incidental ingestion and dermal contact with sediment in the unnamed stream as well as dermal contact with surface water in the unnamed stream.
- Residents (child [0-6 years] and adults): incidental ingestion, dermal contact and inhalation of particulates and volatiles released from surface soils at the Former Weller property.
- Outdoor Worker (adult): incidental ingestion, dermal contact and inhalation of particulates and volatiles released from surface soils at the Mastel Ford Dealership property and the Independent Auto Dealership property.

Pathways specific to future scenarios only included:

- Construction Worker (adult): incidental ingestion, dermal contact and inhalation of particulates and volatiles released from surface soil (0-2 feet bgs) and subsurface soil (2-10 feet bgs) throughout OU4 of the Site.
- Resident (child [0-6 years] and adult): ingestion, dermal contact, and inhalation of chemical vapors from groundwater while showering or bathing if a well was installed at the site for potential use as tap water.
- Indoor Worker (adult): ingestion of tap water while working if a well was installed at the site for potential use as tap water,

Vapor migration from groundwater, through soil, and intrusion into indoor air was also evaluated qualitatively as a potential exposure pathway as described later in this section. A complete summary of all exposure scenarios can be found in the baseline human health risk assessment.

Contaminant Exposure Evaluation Process

In this assessment, exposure point concentrations (EPCs) were estimated using either the maximum detected concentration of a contaminant or the 95% upper-confidence limit (UCL) of the average concentration. Chronic daily intakes were calculated based on reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. A more detailed discussion of the exposure pathways can be found in the baseline human health risk assessment.

WHAT IS HUMAN HEALTH 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 releases under current- and anticipated 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. that were 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 a site and are referred to as chemicals of concern, or COCs, in the final remedial decision document or Record of Decision.

Summary of the Human Health Risk Characterization

In the risk assessment, two types of toxic health effects were evaluated: cancer risk and noncancer hazard. Calculated cancer risk estimates for each receptor were compared to EPA's target risk range of 1×10^{-6} (one-in-one million) to 1×10^{-4} (one-in-ten thousand). The calculated noncancer hazard index (HI) estimates were compared to EPA's target threshold value of 1. This section provides an overview of the human health risks resulting from exposures to contaminants exceeding the target cancer risk and noncancer hazard thresholds. Risks and hazards for all soil (i.e., residents, outdoor workers and construction workers), sediment (i.e., recreational users) and surface water (i.e., recreational users) exposures were within or below the target risk range and lower than the noncancer threshold of 1. Therefore, the following subsection is limited to risks associated with groundwater exposure only.

Groundwater

Cancer risks and noncancer hazards from exposure to contaminated groundwater were evaluated for future residents and indoor workers in the event a well was installed on-site for potential use as tap water. For the residential scenario, both the cancer risk (5×10^{-2}) and noncancer HI estimates (2,853 for adults and 2,718 for children) exceeded EPA thresholds, as shown on Table 3. The cancer risk (9×10^{-3}) and noncancer HI (607) for the indoor worker exceeded EPA thresholds as well. Cancer risks and noncancer hazards were primarily driven by exposure to chlorinated VOCs (TCE, *cis*-1,2-DCE and vinyl chloride) and to a lesser extent by 1,4-dioxane and metals (arsenic, iron and manganese). The presence of elevated metals in groundwater, however, is unrelated to the Site, as the metals present are known to be naturally occurring and are commonly detected within groundwater in the northeastern United States.

Table 3. Summary of hazards and risks associated with groundwater*

Receptor	Hazard Index	Cancer Risk
Future Resident		
Child (birth to <6 years)	**2,718**	**5×10^{-2}**
Adult	**2,853**	
Future Indoor Worker		
Adult	**607**	**9×10^{-3}**

*Bold indicates value above the acceptable risk range or value.

Vapor Intrusion

Vapor migration from groundwater, through soil, and intrusion into indoor air was also evaluated qualitatively as a potential exposure pathway. For a health risk to exist, a source, a receptor, and a pathway must be present. Although a groundwater source and existing and potential future receptors are present, there is no current pathway for vapor intrusion into indoor air. According to EPA guidance, a buffer zone of approximately 100 feet is used as a guideline to determine which buildings should be included in a vapor intrusion investigation. Occupied buildings within OU4 were identified to be approximately 100 feet or more from the edge of the contaminant plume. Therefore, vapor intrusion was not found to be a currently completed pathway. In addition, a vapor intrusion study was initiated at the Olean Well Field Superfund Site in 2009. Approximately 33 sub-slab soil gas sampling ports were installed in residential and commercial buildings as part of this effort, including one residential property in the OU4 study area. The results of the study did not reveal concentrations of VOCs above the Region 2 screening levels in sub-slab vapor gases at this property. Nevertheless, the groundwater contaminant plume is not considered immobile; therefore, a completed vapor intrusion pathway could potentially exist under future use scenarios.

Ecological Risk Assessment

A SLERA was conducted for OU4 of the Site to determine the potential for risk to ecological receptors based upon exposure to contaminants in soil, surface water, and sediment. Chemicals detected in these media were screened against values protective of ecological receptors representative of OU4 of the Site.

Overall, the results of the SLERA suggest that potential ecological risks from metals and organic compounds in surface water and sediment are negligible and unlikely to pose risk to aquatic life in the unnamed stream. Select metals and organic compounds exceeded screening levels in soil but those exceedances were largely restricted to one or a few isolated sample locations. In addition, OU4 consists mostly of mowed areas, paved surfaces, residential and commercial properties, and gravel-covered roads. As such, the Site is unlikely to be attractive to larger populations of wildlife. Thus, although there may be a localized risk to some individual receptors that are immobile (plants) or have small home ranges (soil invertebrates and small mammals), there is no evidence of sitewide risks to populations or communities of terrestrial receptors from these constituents.

Risk Assessment Summary

In conclusion, elevated cancer risks and noncancer hazards were identified for future residents and indoor workers assumed to use groundwater at OU4 of the Site in place of the current municipal water supply. The elevated cancer risks and noncancer hazards were driven primarily by potential exposure to chlorinated VOCs (TCE, *cis*-1,2-DCE and vinyl chloride) and to a lesser extent by 1,4-dioxane and metals (arsenic, iron and manganese). The presence of elevated metals in groundwater, however, is unrelated to OU4 of the Site. All of these metals are known to be naturally occurring and are commonly detected within groundwater in the northeastern United States. The elevated concentrations observed are not believed to be attributable to activities conducted at the AVX Property, but rather to natural mineralogical variability, potentially combined with the presence of metals-containing fill. Therefore, TCE, *cis*-1,2-DCE, vinyl chloride and 1,4-dioxane in groundwater are the primary Site-related chemicals contributing to elevated risk and hazard at OU4 of the Site.

As indicated by the results of the SLERA, ecological exposures to soil, sediment and surface at OU4 of the Site were considered unlikely to pose risk.

Based on the results of the human health risk assessment, it is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health, welfare and the environment from actual or threatened releases of hazardous substances.

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 (TBC) guidance, and site-specific risk-based levels.

The followings RAOs have been established for OU4 of the Site:

- Eliminate the potential for future human exposure to site contaminants in groundwater at OU4 via direct contact, ingestion, or inhalation of vapors.

- Restore groundwater to beneficial use as a source of drinking water in a reasonable timeframe, by reducing contaminant levels to the more stringent federal or state drinking water standards.

The groundwater preliminary remediation goals established for OU4 are identified in Table 4.

Table 4: Preliminary Remediation Goals for Groundwater

Chemicals of Potential Concern (COPCs)	NYS Groundwater Quality Standards (ppb)	NYS Drinking Water Quality Standards (ppb)	National Primary Drinking Water Standards (ppb)
TCE	5	5	5
cis-1,2-DCE	5	5	70
vinyl chloride	2	2	2
1,4-dioxane	N/A*	1	N/A
1,1,1-TCA	5	5	200
1,1-DCA	5	5	N/A
1,2-DCA	0.6	5	5
1,1-DCE	5	5	7
Chloroethane	5	5	N/A
Trans-1,2-dichloroethene	5	5	100
PCE	5	5	5

*On October 5, 2021, NYSDEC proposed for a 30-day public review and comment period new technical guidance in three draft Technical and Operational Guidance Series (TOGS) documents, including a proposed guidance value for ambient waters used as drinking water sources of 0.35 ppb for 1,4-dioxane.

SUMMARY OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 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 or resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions that employ, as a principal element, treatment to reduce permanently and significantly the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. Section 121(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. §9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with OU4 of the Site can be found in the FS Report, dated July 2022.

The construction time for each alternative reflects only the actual time required to construct or implement the action 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 (Alternative 1), include common components. Alternatives 2 through 6 include a long-term groundwater monitoring program consisting of a comprehensive network of monitoring wells located throughout the OU4 area to ensure that groundwater quality improves following implementation of the given remedy until cleanup levels are achieved and to evaluate geochemical conditions.

Under Alternatives 3 through 6, the long-term groundwater monitoring program would be used to evaluate any transition from active treatment to naturally occurring processes in the treatment areas to achieve cleanup levels. Additional groundwater sampling would also be conducted near Seneca Avenue during the pre-remedial design phase to determine whether the Seneca Avenue Landfill is an additional upgradient source of groundwater contamination to OU4. While the OU1 1985 RI identified the Seneca Avenue Landfill as a potential source area, the OU2 1991 Supplemental RI did not include an investigation of the Seneca Avenue Landfill. In addition, an evaluation of the potential for soil vapor intrusion would be conducted for any buildings developed on the properties comprising OU4.

Alternatives 2 through 6 also include implementation of institutional controls to restrict contaminated groundwater use until RAOs are achieved, and to limit construction above groundwater contamination, to ensure the remedy remains protective. A plan would be developed which would specify the specific form(s) of institutional controls which may include proprietary controls, such as deed restrictions, any existing governmental controls, such as well permit requirements, and/or informational devices, such as publishing advisories in local newspapers and issuing advisory letters to local governmental agencies regarding groundwater use in the impacted area. A site management plan (SMP) would be developed to provide for the proper management of the Site remedy post-construction including evaluation of the potential for soil vapor intrusion for any buildings developed within OU4, institutional controls until RAOs are met, and periodic reviews and certifications.

Additionally, because MCLs will take longer than five years to achieve under any of the active alternatives, a review of conditions at the Site will be conducted no less often than once every five years until cleanup levels are achieved.

Alternative 1: No Action

Capital Cost:	$0
Periodic Costs:	$0
Present-Worth Cost:	$0
Construction Time:	Not Applicable

The NCP requires that a "No Action" alternative be used as a baseline for comparing other remedial alternatives. Under this alternative, there would be no remedial actions actively conducted at OU4 to control or remove groundwater contaminants. This alternative also does not include monitoring or institutional controls.

Alternative 2: Monitored Natural Attenuation

This remedial alternative relies on monitored natural attenuation or MNA to address the groundwater contamination. Natural attenuation is the process by which contaminant concentrations are reduced by various naturally occurring physical, chemical, and biological processes. The main processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction of contaminants. These processes occur naturally, in-situ, and act to decrease the mass or concentration of contaminants in the subsurface. Only non-augmented natural processes would be relied upon under this alternative. The main process at work at OU4 of the Site is reductive dechlorination. Implementation of this alternative would include the installation of additional monitoring wells, periodic sample collection and analysis, data evaluation, and contaminant concentration trend analysis.

Capital Cost:	$104,000
Periodic Costs:	$1,322,000
Present-Worth Cost:	$1,426,000
Construction Time:	Less than 1 month

Alternative 3: Permeable Reactive Barrier

Under this alternative, a Permeable Reactive Barrier (PRB) containing a reactive material would be installed at the southern boundary of OU4 to remediate VOCs present in the groundwater, preventing migration beyond the OU4 boundary. A PRB consists of a permeable wall built below the ground surface to intercept and treat contaminated groundwater. The PRB would be built by excavating a narrow trench perpendicular to the path of transport of contamination in groundwater and filling the trench with a reactive material that can destroy or mitigate the transport of VOC-contaminated groundwater while allowing the passage of water. The selection of the reactive material is based on the longevity of the reactive material as well as the byproducts of reactions within the PRB. For the purposes of developing a conceptual design and cost estimate for comparison with other alternatives, the FS estimated that the PRB would consist of constructing one 250-footlong, 20-foot deep, and 3-footwide barrier near the OU4 boundary. The FS also estimated that the PRB would be constructed using zero valent iron (ZVI) as the reactive media. A combination of ZVI and other reactive material may be necessary to effectively treat all of the COPCs at OU4. The exact location, orientation, material used, and operational period for the PRB would be determined during the remedial design. The remedial design would also ensure that the PRB would be constructed so that there are no adverse impacts to the unnamed stream and that the stream does not impact its effectiveness. In addition to active treatment, this alternative also includes the evaluation of any transition from active treatment to naturally occurring processes in the treatment areas to achieve cleanup levels.

Capital Cost:	*$*957,000
Periodic Costs:	*$*1,322,000
Present-Worth Cost:	*$*2,279,000
Construction Time:	2 Months

Alternative 4: Air Sparging/Soil Vapor Extraction (AS/SVE)

Under this alternative, an AS/SVE system would be built including the installation of a network of vertical air injection or sparging wells in areas of highest groundwater contamination into the saturated zone of the aquifer and a network of vapor extraction wells installed into the unsaturated zone. A stream of air under pressure would be injected into the subsurface via the sparging well, and extraction wells would be used to remove contaminants in the vapor phase. VOCs in the vapor phase would be collected from each vacuum extraction well and pumped to a treatment system and treated using activated carbon or broken down by a catalytic oxidizer. In-well air stripping can be implemented in different system configurations. In addition to active treatment, this alternative also includes the evaluation of any transition from active treatment to naturally occurring processes in the treatment areas to achieve cleanup levels.

For the purposes of developing a conceptual design and cost estimate for comparison with other technologies, the FS estimated the installation of three AS wells in each of the three areas of highest contamination (e.g., near monitoring wells MW-35S, AVX-24S, and MW-27S) for a total of nine AS wells, and 12 SVE wells to collect the sparge gas. The conceptual design estimates that the AS/SVE system would operate for a period of 10 years.

Under the conceptual design, attenuation processes would subsequently be relied upon to provide further VOC reduction until PRGs are achieved.

Long-term groundwater monitoring would provide the data necessary to evaluate whether natural attenuation is occuring at a rate capable of achieving PRGs in a reasonable timeframe or active treatment should continue beyond 10 years, including in the event that concentrations in the areas of active treatment have reached an asymptotic state, which may result in the cessation of the AS/SVE system. Long-term monitoring of attenuation processes would continue.

During the remedial design, a pilot test would be performed to determine the configuration of the system and the type of air treatment that would be required. The remedial design would also ensure that the AS/SVE would be constructed so that there are no adverse impacts to the unnamed stream and that the stream does not impact its effectiveness.

Capital Cost:	$856,000
Periodic Costs:	$3,096,000
Present-Worth Cost:	$3,952,000
Construction Time:	*2 Months*

Alternative 5: In-situ Chemical/Biological Treatment

This remedial alternative involves the injection of amendments in areas of highest groundwater contamination into the saturated zone of the aquifer to promote in-situ chemical reduction (ISCR), in-situ chemical oxidation (ISCO) and/or enhanced bioremediation thereby reducing VOC concentrations. Once injection occurs, this technology is passive and relies on the transport of the dissolved VOCs in groundwater to the treatment zone.

Injection of ISCR materials is used to chemically reduce contaminants by creating abiotic reductive dechlorination of VOCs, whereas the injection of ISCO materials is used to chemically oxidize contaminants in the dissolve phase. Enhanced bioremediation involves the injection of an electron donor into the groundwater to increase the rate of anaerobic biodegradation.

This alternative would involve the construction of multiple wells within the contaminant plume, grouped within and around areas with the highest concentration of contaminants. The reductant or electron donor material would be injected intermittently. In addition to active treatment, this alternative also includes the evaluation of any transition from active treatment to naturally occurring processes in the treatment areas to achieve cleanup levels.

For the purposes of developing a conceptual design and cost estimate for comparison with other technologies, the FS evaluated an electron donor material. The FS assumed that four lines of injection points would be installed downgradient of the contaminant hotspots with an estimated 50 injection points. During the remedial design, a treatability study would be conducted to determine the configuration and number of injection points, the frequency of injections, as well as the injected reagent would be determined.

Capital Cost:	$833,000
Periodic Costs:	$2,006,000
Present-Worth Cost:	$2,839,000
Construction Time:	*1 Month*

Alternative 6: Groundwater Pump and Treat

This remedial alternative consists of the extraction of groundwater and treatment prior to disposal. Groundwater would be pumped to remove contaminant mass from areas of the aquifer with elevated concentrations of contaminants. Air stripping and/or granular activated carbon would be used to treat the extracted groundwater. During the remedial design, the method of groundwater extraction would be determined. For the purposes of developing a conceptual design and cost estimate for comparison with other technologies, the FS estimated that a horizontal well with a depth of 10 to 15 feet and length of 160 horizontal feet would be installed. Due to the poor permeability of subsurface soils, a hydraulic trench could be paired with singular or multiple horizontal or vertical wells to ensure that the required mass removal is achieved. During the remedial design, a determination would also be made regarding whether the discharge of treated extracted groundwater would be to the unnamed stream located on the Mastel Ford Dealership property, discharge to the publicly owned water treatment facility, or reinjection to the ground. Depending on the discharge method, additional treatment for 1,4-dioxane may be necessary to meet discharges requirements, if any, for the protection of ambient waters used as drinking water sources. In addition to active treatment, this alternative also includes the evaluation of any transition from active treatment to naturally occurring processes in the treatment areas to achieve cleanup levels. The conceptual design estimates that the pump and treat system would operate for a period of 20 years, and that attenuation processes would subsequently be relied upon to provide further VOC reduction until PRGs are achieved.

Long-term groundwater monitoring would provide the data necessary to evaluate whether natural attenuation is occurring at a rate capable of achieving PRGs in a reasonable timeframe or active treatment should continue beyond 20 years, including in the event that concentrations in the areas of active treatment have reached an asymptotic state, which may result in the cessation of the groundwater pump and treat system. Long-term monitoring of attenuation processes would continue.

Capital Cost:	*$578,000*
Periodic Costs:	*$2,558,000*
Present-Worth Cost:	*$3,136,000*
Construction Time:	*2 Months*

EVALUATION OF ALTERNATIVES

In evaluating the remedial alternatives, each alternative is assessed against nine evaluation criteria set forth in the NCP namely, overall protection of human health and the environment, compliance with ARARs, 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 below for a more detailed description of the evaluation criteria.

This section of the Proposed Plan summarizes the evaluation the relative performance of each alternative against the nine criteria, noting how each compares to the others under consideration. The detailed analysis of alternatives can be found in the FS Report.

Overall Protection of Human Health and the Environment

Alternative 1 (No Action) is not protective of human health and the environment since it does not include active monitoring of the groundwater contamination. Alternative 2 (MNA) would be protective of human health and the environment because it relies on a combination of contaminant concentration reduction in groundwater via naturally occurring processes (reductive dechlorination, dilution and dispersion) and limitation of exposure to contaminants through maintenance of existing governmental controls and implementation of additional proprietary controls and/or informational devices. Institutional controls would help limit exposure by restricting the use of, and access to, contaminated groundwater.

Alternatives 3, 4, 5 and 6 are active remedies that address groundwater contamination and would restore groundwater quality over the long term. Alternatives 3, 4, 5 and 6 would also rely on certain attenuation processes to achieve the cleanup levels for areas outside of the treatment zones, and would be verified based on natural attenuation parameter evaluations. Long-term groundwater monitoring would monitor the migration and fate of the contaminants and ensure that human health is protected. Protectiveness under Alternatives 3, 4, 5 and 6 requires a combination of actively reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants until preliminary remediation goals are achieved through institutional controls which may include governmental or proprietary controls as well as informational devices, as noted above.

Alternatives 2, 3, 4, 5 and 6 would achieve the RAOs. Alternative 1 (No Action) would not achieve the RAOs. Because Alternative 1 is not protective of human health and the environment, it is not further discussed under the remaining evaluation criteria.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

EPA and NYSDOH have promulgated MCLs (40 CFR Part 141, and 10 NYCRR § 5- 1.51 Chapter 1), which are enforceable standards for various drinking water contaminants (chemical-specific ARARs). The aquifer underlying OU4 is classified as Class GA (6 NYCRR 701.18), meaning that it is designated as a potable water supply. Because area groundwater is a source of drinking water, the MCLs are applicable or relevant and appropriate requirements. The federal MCLs and State standards for OU4 are identified on Table 4, above. If the standards are not equivalent, compliance with the more stringent standard is required.

While Alternative 5 and Alternative 6 would both comply with the chemical-specific ARARs (the MCLs), the PRB under Alternative 3 and AS/SVE under Alternative 4 may not treat 1,4-dioxane (refer to Table 4) and, therefore, not all chemical-specific ARARs may be met. Under Alternatives 3, 4, 5 and 6, attenuation processes would be relied upon to achieve the MCLs in areas outside active treatment. Similarly, if the weight of evidence demonstrates that VOC concentrations in the areas of

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 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.

active treatment under Alternatives 5 and 6 have reached an asymptotic state and active treatment is no longer appropriate, attenuation processes would also be relied on in these areas. Alternative 5 will potentially reach ARARs sooner than Alternatives 4 and 6 depending on the configuration and number of injection points, the frequency of injections, as well as the injected reagent. Under Alternatives 4 and 6, active treatment may impact the rate at which natural attenuation is occurring in the future.

A timeframe of 30 years was assumed for each of the active alternatives for the purpose of costing and comparison of alternatives. In order to refine the amount of time required for the active remedial alternatives to achieve RAOs, during remedy implementation additional information may be collected, including:

- Modeling of naturally occurring attenuation processes;
- For the Groundwater Pump and Treat alternative, evaluating/modifying pumping and extraction rates for groundwater and soil vapor;
- For the In-Situ Chemical/Biological Treatment alternative, evaluating infiltration and breakdown rates for injected reagents; and/or
- For the PRB alternative, evaluating breakdown rates through the barrier.

It is anticipated that this information may be obtained during the remedial design through the implementation of a pilot study and/or modeling of the remedy.

Refer to Table 3-1a in the FS Report for information regarding chemical-specific ARARs.

Under Alternative 2, chemical-specific ARARs would be attained through certain natural processes (reductive dechlorination, dilution and dispersion). Although evidence indicates that biodegradation of VOC contaminants is occurring, given the elevated concentrations of contaminants in groundwater, achievement of the preliminary remediation goals under Alternative 2 is not anticipated to occur within a reasonable timeframe as compared to Alternatives 3, 4, 5 and 6.

Each of the alternatives would comply with location- and action-specific ARARs. Refer to Table 3-1b and 3-1c in the FS Report for details.

Long-Term Effectiveness and Permanence

Alternative 2 relies on naturally occurring, in-situ processes to decrease the concentrations of contaminants over time. While anaerobic degradation has been shown to occur at OU4, given the elevated concentrations of contaminants present, the timeframe to achieve MCLs and long-term protectiveness is not anticipated to occur in a reasonable timeframe as compared to Alternatives 3, 4, 5 and 6. Under Alternative 3, as the contaminant plume migrates downgradient within OU4, it would pass through a PRB, reducing the contaminant concentrations in groundwater permanently. AS/SVE under Alternative 4 relies on physically removing and collecting the contaminants. While AS/SVE is considered an effective technology for treatment and/or containment of contaminated groundwater, AS may not be an effective technology for removing 1,4-dioxane and thus may not be protective in the long-term. In-situ Chemical/Biological Treatment under Alternative 5 and Pump and Treat under Alternative 6 are both considered effective technologies for treatment and/or containment of contaminated groundwater, if designed and constructed properly and would therefore be effective in the long-term.

All four of the active alternatives rely on a combination of treatment in areas of highest groundwater contamination, attenuation processes, including reductive dechlorination, dilution and dispersion, for areas where active remediation is not implemented, and institutional controls.

Alternatives 2, 3, 4, 5 and 6 would require routine groundwater quality, performance, and administrative monitoring, including CERCLA five-year reviews.

Potential site impacts from climate change have been assessed, and the future performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

Reduction of Toxicity, Mobility, or Volume

Alternatives 3, 4, 5 and 6 reduce the toxicity and volume of contaminants at OU4 through treatment of contaminated groundwater. Alternative 5 would provide the greatest reduction in mobility, toxicity, and volume of VOCs by chemically reducing or oxidizing contaminants in groundwater where they are located to less harmful compounds. Alternatives 4 and 6 provide the next highest level of reduction of toxicity, mobility or volume through the treatment of extracted groundwater or soil vapor. While the mobility of contaminants would be reduced under Alternative 6 by creating a gradient for contaminant migration towards the extraction wells, Alternative 4 would result in a temporary increase in the mobility of the contaminants to be captured and treated. Under Alternative 3, the reduction in mobility, toxicity, and volume of VOCs in groundwater occurs as groundwater migrates downgradient through the permeable reactive barrier prior to migrating beyond the OU4 boundary. The reagent material would be selected based on the results of the treatability study conducted during the design. Alternative 2 does not reduce the mobility of contaminants and relies on natural processes (reductive dechlorination, dilution, dispersion, and diffusion) to reduce the toxicity and volume of contaminants.

Short-Term Effectiveness

Alternatives 2 through 6 may have short-term impacts to remediation workers, the public, and the environment during implementation. Alternative 2 could have minimal adverse short-term impacts since two additional groundwater monitoring wells would be installed and there is potential exposure associated with the groundwater sampling program. However, occupational health and safety controls would be implemented to mitigate exposure risks. The estimated construction time frame for Alternative 2 is less than one month.

Alternative 3 has the most adverse short-term impacts. The construction of the PRB would require extensive earth work and shoring. Additionally, there will have to be one stream crossing installed. If Alternative 6 involves construction of a hydraulic trench, it will require similar earth work and shoring though it is likely that no stream crossing will be involved. Alternative 5 has fewer short-term impacts than Alternative 3. The potential exposure associated with the reagent used for the injections elevates Alternative 5 above Alternative 4 and Alternative 6. However, occupational health and safety controls would be implemented to mitigate exposure risks. Alternative 4 offers fewer adverse impacts in the short-term than Alternative 6 in that Alternative 6 involves more construction activities. The estimated construction time frame for Alternative 5 is one month and Alternative 3, 4, and 6 each have a construction time frames of 2 months.

For Alternatives 3 through 6, implementation of a health and safety plan, traffic controls, noise control and managing the hours of construction operation could minimize any short-term impacts to the community. Health and safety measures would also be implemented during operation and maintenance activities to protect Site workers.

Implementability

All technologies under active Alternatives 3, 4, 5 and 6 are established technologies with commercially available equipment and are implementable.

The easiest of the active alternatives to implement is Alternative 5. In-situ injection of the reagents would be accomplished using direct-push methodology or a network of monitoring wells. Alternative 3 is the next easiest alternative to implement since the PRB would require minimal maintenance after installation. Because of the poor permeability of the subsurface soils, Alternative 6 is anticipated to be the most difficult of the active alternatives to implement and would likely require the installation of a horizontal extraction well or a hydraulic trench paired with singular or multiple horizontal or vertical wells to ensure that sufficient mass removal is achieved. These groundwater extraction configurations would significantly increase the footprint of the remedial system and require coordination with the property owners of the impacted parcels. Alternative 4 has some of the same components as Alternative 6. However, it is not as complex and it would not require the extensive monitoring associated with pump and treat technology.

Cost

The estimated capital, O&M, and present worth costs are presented in Table 5 below and discussed in detail in the FS Report. The cost estimates are based on the best available information. Alternative 1: No Action has no cost because no activities are implemented. The highest present worth cost alternative is Alternative 5, at $4.53 million.

Table 5: Summary of Costs

Alternative	Capital Cost	O&M Costs	Present Worth*
Alternative 2	$107,000	$2,182,000	$2,289,000
Alternative 3	$970,000	$1,465,000	$2,435,000
Alternative 4	$882,000	$3,363,000	$4,245,000
Alternative 5	$1,439,000	$3,090,000	$4,529,000
Alternative 6	$724,000	$2,723,000	$3,447,000

* 30-year present worth cost calculations includes a 7% discount rate.

State/Support Agency Acceptance

NYSDEC has consulted with NYSDOH and 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 Responsiveness Summary section of the Record of Decision for OU4.

PREFERRED REMEDY AND BASIS FOR PREFERENCE

Based upon an evaluation of the remedial alternatives, EPA, in consultation with NYSDEC, proposes Alternative 5, In-situ Chemical/Biological Treatment as the preferred remedy for OU4.

The preferred alternative has as its key components: 1) in-situ treatment of contaminated groundwater to chemically reduce or oxidize contaminants; 2) long-term monitoring; 3) attenuation processes; and 4) institutional controls. The number of injection points, reagents to be injected, injection dosages, duration of injections, and frequency of supplemental injections would be determined during the remedial design. The injection network would be designed with the placement of injection points in areas with the highest concentration of contaminants (refer to Figure 3).

The preferred alternative includes the following additional elements:

- Implementation of a long-term groundwater monitoring program to track and monitor changes in the groundwater contamination at OU4 to ensure the RAOs are attained. Additional monitoring wells as shown in Figure 3 would be installed and included as part of the monitoring well network. The sampling program would also monitor groundwater quality including geochemical conditions and degradation byproducts generated by the treatment processes. The results from the long-term monitoring program would be used to evaluate the migration and changes in VOC contaminants over time.
- Institutional controls to limit use of groundwater until RAOs are achieved, and limitations on construction above groundwater contamination, to ensure the remedy remains protective. A plan would be developed which would specify institutional controls to restrict exposure to hazardous substances until RAOs are met which are anticipated to include proprietary controls, such as deed restrictions for groundwater use, existing governmental controls, such as well permit requirements, and/or informational devices, such as publishing advisories in local newspapers and issuing advisory letters to local

governmental agencies regarding groundwater use in the impacted area.

Development of a site management plan (SMP) to provide for the proper management of the OU4 remedy post-construction and the evaluation of the potential for soil vapor intrusion for any buildings developed within OU4, including through the use of institutional controls until RAOs are met, and will also include long-term groundwater monitoring, periodic reviews and certifications.

- The environmental benefits of the preferred remedial alternative may be enhanced by employing design technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy.[4]

The total estimated present-worth cost for the preferred alternative is $4,529,000. This is an engineering cost estimate that is expected to be within the range of plus 50 percent to minus 30 percent of the actual project cost. Further detail on the cost is presented in Section 5 of the FS Report.

While the preferred remedy would ultimately result in reduction of contaminant levels in groundwater such that levels would allow for unlimited use and unrestricted exposure, it is anticipated that it would take longer than five years to achieve these levels. As a result, in accordance with CERCLA, the Site is to be reviewed at least once every five years until cleanup levels are achieved and unrestricted use is achieved.

Basis for the Remedy Preference

While Alternative 5: In-situ Chemical/Biological Treatment and Alternative 6: Groundwater Pump and Treat both use proven technologies to actively treat VOC-contaminated groundwater in OU4, Alternative 5 is easier to implement. Alternative 6 is anticipated to be more difficult to implement because of the poor permeability of the subsurface soils and would take longer to achieve PRGs than Alternative 5. Alternative 3 (Permeable Reactive Barrier) and Alternative 4 (Air Sparging/Soil Vapor Extraction) may not treat all of the VOC contaminants present. Alternative 2 (Monitored Natural Attenuation) relies on natural processes and is not expected to achieve MCLs in a reasonable timeframe.

The preferred alternative satisfies the following statutory requirements of Section 121(b) of CERCLA: 1) the proposed remedy is protective of human health and the environment; 2) it complies with ARARs; 3) it is cost effective; 4) it utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) it satisfies the preference for treatment. Long-term monitoring would be performed to assure the protectiveness of the remedy. With respect to the two modifying criteria of the comparative analysis, state acceptance and community acceptance, NYSDEC concurs with the preferred alternative, and community acceptance will be evaluated upon the close of the public comment period.

[4] See http://www.epa.gov/greenercleanups/epa-region-2-clean-andgreen-policy and http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf

Figure 1: Site Location Map

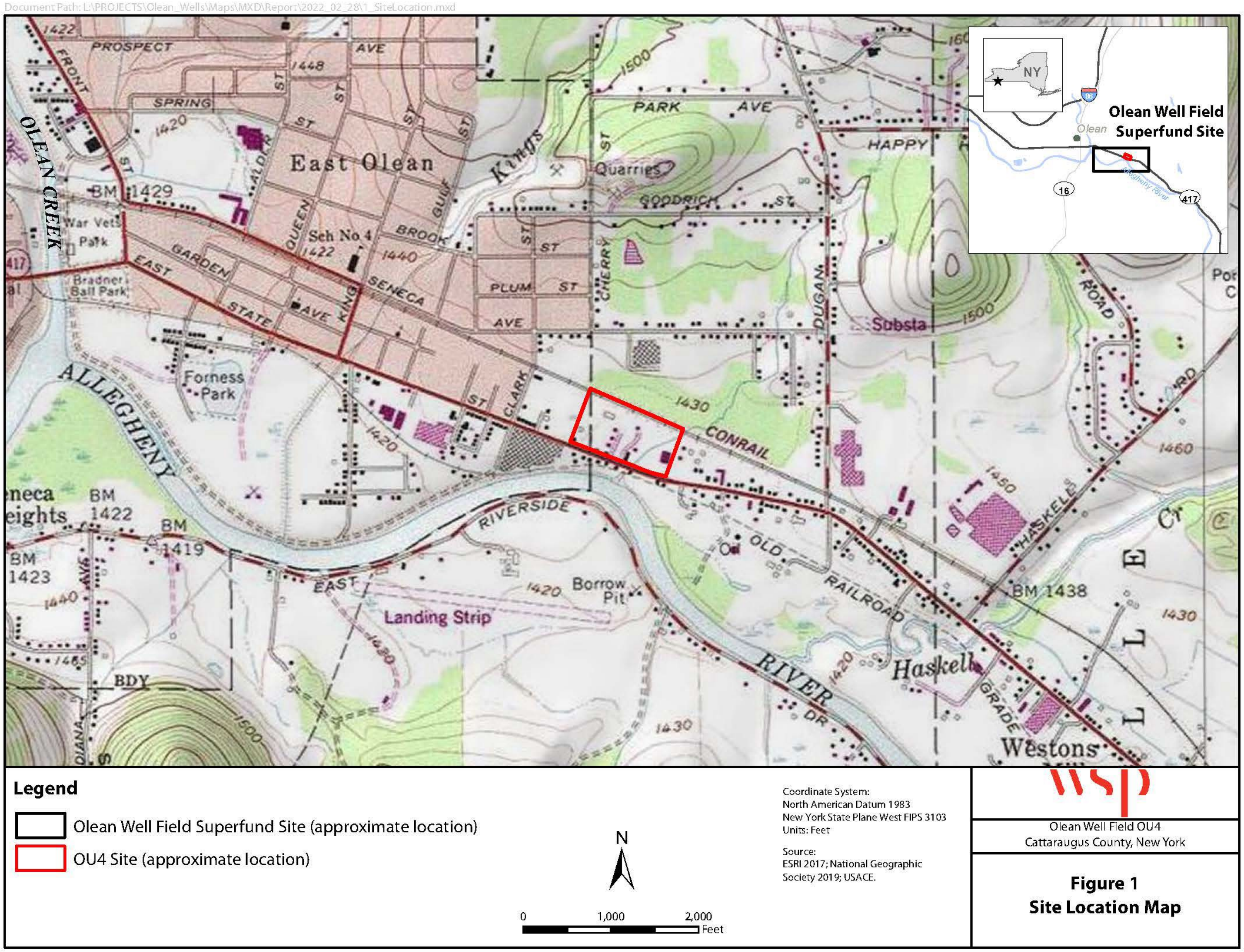

Figure 2: Operable Units

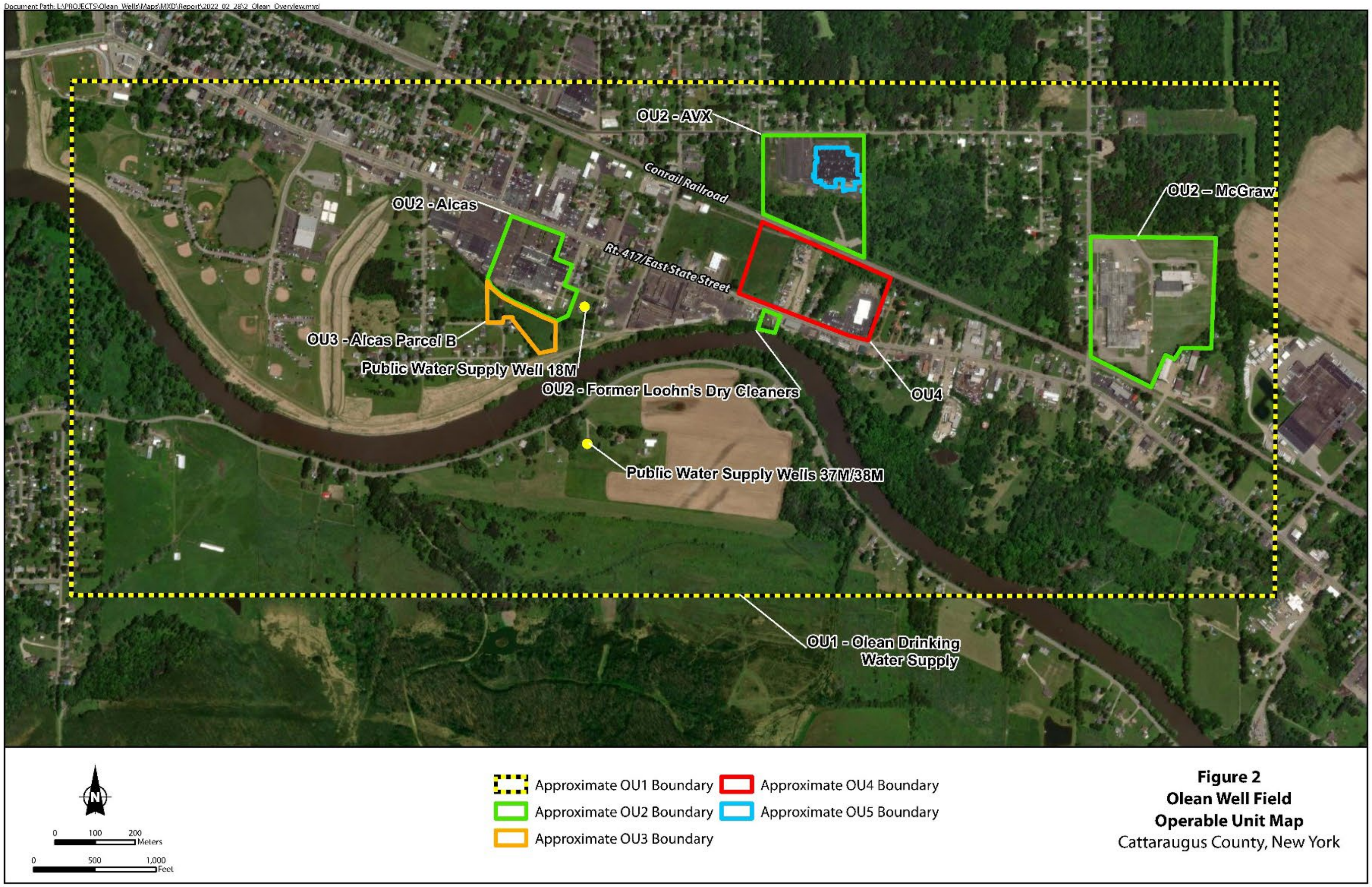

Figure 3: Alternative 5 Conceptual Model