
U. S. EPA Superfund Program

Proposed Plan for Interim Remedial Action

**Chem-Fab Superfund Site (Operable Unit 2)
Doylestown, Pennsylvania**

EPA ANNOUNCES PROPOSED PLAN

October 2016

A. INTRODUCTION

The United States Environmental Protection Agency (EPA) is issuing this Proposed Remedial Action Plan (Proposed Plan) to present the Preferred Alternative for an interim remedial action to address groundwater contamination (Operable Unit 2 or OU2) at a portion of the Chem-Fab Superfund Site (Site). This Plan provides the rationale for proposing the Preferred Alternative and includes a summary of alternatives evaluated for interim cleanup at OU2 of the Site. The EPA is the lead agency for Site activities, and the Pennsylvania Department of Environmental Protection (PADEP) is the support agency.

Dates to Remember

**October 1, 2016 to
October 31, 2016**
Public Comment Period on
EPA's Proposed Plan

**October 18, 2016,
6:30pm to 8:30pm**
Public Meeting
Doylestown Borough Hall
57 W. Court Street
Doylestown, PA 18901

EPA, in consultation with PADEP, will select an interim remedy for OU2 after reviewing and considering all information submitted during the 30-day public comment period held between October 1, 2016 and October 31, 2016.

EPA, in consultation with PADEP, evaluated the following alternatives for addressing groundwater contamination at a portion of the Site known as the Area of Highest Contamination (AOHC):

Alternative 1: No Action

Alternative 2: Groundwater Extraction and Treatment with Air Stripping, Ultraviolet (UV) Oxidation, Ion Exchange, and Carbon Adsorption

Alternative 3: Groundwater Extraction and Treatment with Air Stripping, Photocatalytic Membrane (Photo-Cat), and Carbon Adsorption

Based on the available information, the Preferred Alternative proposed for public comment at this time is **Alternative 2: Groundwater Extraction and Treatment with Air Stripping, UV Oxidation, Ion Exchange, and Carbon Adsorption**. The estimated cost for this alternative is \$8,111,000. Although this is the Preferred Alternative at the present time, EPA and PADEP welcome the public's comments on all of the alternatives

listed above. The public comment period ends on October 31, 2016. After the close of the public comment period and consideration of comments, EPA will document selection of the remedy in a Record of Decision (ROD) for interim action. The public's comments and EPA's responses will be documented in the Responsiveness Summary section of the ROD. Therefore, the public is encouraged to review and comment on all alternatives presented in this Proposed Plan. EPA, in consultation with PADEP, may modify the Preferred Alternative or select another interim response action presented in this Proposed Plan based on new information or public comments.

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, as amended (CERCLA), 42 U.S.C. § 9617, and Section 300.430(f) (2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. §300.430(f) (2).

This Proposed Plan highlights key information that can be found in greater detail in the Focused Feasibility Study (FFS) and other documents contained in the Administrative Record file supporting selection of this interim remedial action. EPA and PADEP encourage the public to review these documents to gain a more comprehensive understanding of the Site and Superfund activities that have been conducted at the Site. The Administrative Record file for this action can be accessed at <http://go.usa.gov/xK4CB> or at the following locations:

Bucks County Free Library
150 South Pine Street
Doylestown, PA 18901
Hours: Call (215) 348-9081

EPA Administrative Records Room
Administrative Coordinator
1650 Arch Street
Philadelphia, PA 19103
Phone: (215) 814-3157
Hours: Monday-Friday 8:30 am to 4:30pm
By appointment only

B. SITE BACKGROUND

Site Location and Description

The Chem-Fab Site is located on property at and around 300-360 N. Broad Street in Doylestown, Montgomery County, Pennsylvania (Property) upon which industrial and disposal operations occurred in the past as well as other properties on which contamination from such operations has migrated or otherwise come to be located. The Site layout is provided in Figure 1. The Property is a one acre parcel and currently contains a small office park which hosts several commercial tenants.

Prior to the development of the Chem-Fab facility, the Property was previously used as farmland. From the mid-1960s to the early 1990s, Chem-Fab, Inc. (Chem-Fab) operated an electroplating and metal etching facility on the Property. Chem-Fab's operations

generated wastes that included metals; volatile organic compounds (VOCs) such as 1,1,1-trichloroethane (1,1,1- TCA), methylene chloride, and trichloroethylene (TCE); ferric chloride; mineral spirits; chromic acid rinse water and sludge; chromic acid; sulfuric acid; sodium bisulfate; and sodium hydroxide. While perfluoroalkyl substances (PFASs) usage has not been documented at the Chem-Fab facility, PFAS usage is often associated with chromium plating operations. The Chem-Fab facility was cited several times during the 1960s and 1970s by both the Bucks County Department of Health and the Pennsylvania Department of Environmental Resources, now the Pennsylvania Department of Environmental Protection (PADEP), for spills and releases of industrial wastes from above-ground storage tanks (ASTs), underground storage tanks (USTs), and the catch basin, all located on the Property, to Cooks Run, a nearby creek. These releases included chromic acid rinse water spills from broken valves on pretreatment tanks and overflows of the catch basin.

In the late 1970s, Chem-Fab was acquired by Boarhead Corporation, a business established by Manfred DeRewal, Sr. (DeRewal) to acquire property. Boarhead Corporation also owned a property located approximately 20 miles from the Chem-Fab Site, which is currently the Boarhead Farms Superfund Site. DeRewal also owned DeRewal Chemical Company Inc. (DCC), which removed, transported, and disposed of chemical waste generated by other companies. During the 1970s, DCC disposed of chemical wastes at locations which included the future Boarhead Farms Superfund Site, a rented warehouse property on Ontario Street in Philadelphia, and the Wissinoming Industrial Park in Philadelphia. During this period, liquid wastes, including hundreds of thousands of gallons of ammonia, hydrochloric acid, and pickle liquor waste, were transported from various industrial entities to Chem-Fab for disposal. In addition to Chem-Fab, two other entities associated with DeRewal -- a gallium reclamation business and a computer assembly outfit -- operated at the Property during the 1980s and 1990s, respectively.

Previous Environmental Investigations and Actions

In August 1987, the EPA performed a Preliminary Assessment and Site Inspection (PA/SI) at the Doylestown Groundwater Site and the Chem-Fab Site. During the PA/SI, water samples from residential wells and the municipal well located in the vicinity of the Chem-Fab Site were found to contain levels of VOCs including TCE and tetrachloroethylene (PCE) exceeding drinking water standards. In October 1987, EPA conducted a Removal Action which included the delivery of bottled water and carbon filtration units to affected residences and connection of affected residences to public water supplies.

In September 1994, EPA conducted a removal assessment at the Property. EPA found improperly and incompatibly stored drums of hazardous material, including flammable liquids and acids. Samples from these drums indicated the presence of acids, TCE, and chromium. EPA also found a 50-foot long UST which contained approximately 6,000 gallons of liquid and sludge and appeared to be leaking into the ground. Samples from

the UST were found to contain hexavalent chromium. Samples taken from a sump located inside the warehouse indicated the presence of TCE.

In 1994-1995, EPA conducted a second Removal Action at the Chem-Fab Site. During that response, EPA removed 117 drums and 8,400 gallons of liquid wastes, including chromium-contaminated wastes from the UST as well as other solid wastes and fuel oils. During the response action, EPA found label information on drums and other containers indicating the presence of xylene, toluene, hydrochloric acid, sulfuric acid, nitric acid, caustic soda, methyl isobutyl ketone, polymeric isocyanate, benzene sulfonic acid, nickel rinse waste, methylene chloride, ferric chloride, chromate waste acid, and anhydrous ammonia.

In 1998, PADEP assumed the lead role in further assessing the Chem-Fab Site. Beginning in 1999, PADEP began an investigation of the soils and groundwater in the vicinity of the Site. PADEP found hexavalent chromium (Cr[VI]) and VOCs in the soils and in the groundwater on the Property and on an adjacent property. Visible chromium contamination was found in the drainage ditch on the adjacent property. In 2004, PADEP issued a Statement of Decision selecting a groundwater remedy for the Site. The selected groundwater remedy was groundwater monitoring, ex situ treatment, in situ groundwater treatment and reinjection. However implementation of the remedy was delayed due to technical issues and lack of funding. PADEP continued its investigation and requested that EPA list the Site on the CERCLA National Priorities List (NPL). EPA proposed the Chem-Fab Site for the NPL in September 2007. The Site was formally added to the NPL in March 2008.

In September 2009, EPA initiated a fund-lead Remedial Investigation and Feasibility Study (RI/FS) to comprehensively characterize the nature and extent of contamination at the Chem-Fab Site and to evaluate alternatives for addressing threats to human health and the environment presented by such contamination. The Remedial Investigation (RI), which has not yet been completed, has thus far included additional soil, sediment, and groundwater testing to supplement previous investigations conducted by PADEP. EPA has also conducted vapor intrusion (VI) sampling in the homes of residents living down-gradient from the Site, and has conducted VI sampling in the commercial spaces at the Property.

In November 2012, EPA initiated a third Removal Action intended to reduce VOCs in suites inside an office building located on the Property. This Removal Action involved the installation of portable air purifiers into selected suites within the impacted building. Additional indoor air sampling was conducted at the former Chem-Fab facility, and in 2015, a subslab vapor mitigation system was installed to reduce concentrations of VOCs in both the indoor air and subslab. In January 2016, sampling was performed to confirm that the treatment system had reduced levels of VOCs in the indoor air and subslab to acceptable levels.

In December 2012 an Interim ROD for Operable Unit 1 (OU1) was signed. OU1 consisted of removing contaminated soils outside the footprint of the buildings on the

Property. The selected remedy in the Interim ROD consisted of excavation and disposal of contaminated soils and backfilling the excavation with clean fill.

In September 2013, EPA selected a fourth Removal Action consisting of excavation and off-Site disposal of certain contaminated soils located at the Property. This Action focused on the contaminated soils that were the subject of the Interim ROD for OU1 and selected the same cleanup levels. Between March and August of 2014, the Removal Action was implemented. Post-excavation sampling confirmed that soil had been excavated to cleanup levels.

In August 2015, EPA began work on a Focused Feasibility Study (FFS) to identify alternatives for an interim remedial action to address the most significant groundwater contamination at the Site based on data collected by EPA during the current Remedial Investigation and by PADEP in its previous investigations. The FFS, dated September 2016, summarizes these investigations and identifies alternatives for addressing problems presented by contaminated groundwater within the AOHC.

C. SITE CHARACTERISTICS

See Section B (Site Background) for a description of the Chem Fab Site and the Property. The Property is currently zoned for commercial use and contains a small office park with three buildings housing several commercial tenants, partially vegetated land, paved and gravel driveways and parking areas, and a concrete pad in the rear of the main (largest) building. The Property is bordered to the north by North Broad Street, to the east by an operating commercial business, and to the south and west by an active self-storage facility. Ground elevations in the area range from approximately 340 to 360 feet above mean sea level (msl), with the ground sloping gently to the west towards Cooks Run. A map of the Property and surrounding areas is provided as Figure 1. The following sections summarize EPA's current information regarding environmental conditions at the Site; additional information is being developed in the ongoing Remedial Investigation.

Soil

Soils at the Chem Fab Site are associated with the Doylestown Series and Abbottstown Series; both soil types are considered to be poorly to moderately permeable and allow for slow to moderate runoff. Across much of the Site, the aforementioned soil series are overlain by fill material. The exact nature of the fill material likely consists of various unconsolidated local soils and gravel compacted and used to level and develop the Site to its current state.

Between 1999 and 2007, PADEP conducted investigations to assess the soils, groundwater, and surface water at and in the vicinity of the Property. PADEP's investigations revealed high levels of soil contamination on the Property and the presence of Site-related contamination in the groundwater underneath, and migrating from, the Property.

During the course of its investigation, PADEP collected 261 soil samples from 168 locations at and around the Property between 1999 and 2007. Soil at the Property was found to be contaminated with 47 chemicals above EPA Regional Screening Levels (RSLs). The most significant exceedances included Cr [VI], PCE, and TCE. Cr[VI], PCE, and TCE were found at concentrations up to 781 mg/kg, 190 mg/kg, and 4,000 mg/kg, respectively. The area of highest soil contamination roughly corresponds to the area where the above-ground tank farm was previously located. The former Chem-Fab facility had six ASTs as well as a 10,000 gallon UST. Drums of hazardous waste were also found in this area during the 1994 EPA Removal Action.

As stated in Section B, in December 2012, an Interim ROD was developed to provide a remedy to address the soil contamination outside the footprint of the existing buildings on the Property. The selected remedy consisted of excavation and disposal of contaminated soils and backfilling the excavation with clean fill. In September 2013, EPA selected a Removal Action to excavate and dispose off-Site certain contaminated soils located at the Property. This Removal Action met the performance standards of the Interim ROD. Between March and August of 2014, the Removal Action was implemented by EPA and the contaminated soils on the Property were excavated and disposed off-Site.

Surface Water

Cooks Run is the sole named water body located within a 1-mile radius of the former Chem-Fab facility. Surface drainage from the Chem-Fab Property generally flows to the west and southwest toward Cooks Run via overland flow. A surface swale is also present on the self-storage facility to the east and empties into Cooks Run. Cooks Run also receives groundwater from areas where the stream directly intersects the local groundwater table, as well as from nearby groundwater upwelling, which flows into Cooks Run in the form of overland flow. Cooks Run is a tributary of Neshaminy Creek, which eventually flows into the Delaware River.

In addition to Cooks Run, surface water is also present adjacent to the Chem-Fab property in the form of forested wetlands and two ponds located south of the self-storage facility. One of the ponds is associated with the adjacent water treatment facility, and the second is a stormwater management pond associated with a housing development. The forested area to the east of Cooks Run includes scattered forested wetlands. These wetlands include isolated pools as well as areas associated with periodic inundation from Cooks Run. While groundwater upwelling does occur in the area, it is unknown to what extent the ponds, isolated wetland pools, or wetlands receive groundwater or discharge surface water into the underlying groundwater system. It is also unknown if the wetland pools associated with the area are permanent or seasonal (vernal) features—an important distinction needed for selection of receptors for future risk assessments. Current field investigations, which include installation of piezometers and staff gauges along Cooks Run, will assist in better defining these relationships as part of the ongoing Remedial Investigation.

Site Geology/Hydrogeology

Overburden material, consisting of soils and saprolite, range in thickness from 4 to 13 feet across the Site. Based on previous investigations, a weathered bedrock zone, consisting of very loose, dry, reddish-brown silt and trace fine to coarse sand, directly overlies the competent bedrock. Depending on the degree of weathering, very stiff reddish-brown clay may also be present.

The Stockton Formation beneath the Site is composed of interbedded sandstones, shale, and shale with siltstone noted sporadically beneath the Site but primarily to the northwest. Rapid lithologic changes are characteristic of the Stockton Formation. Single beds may grade along strike from fine-grained to coarse-grained within a few yards. The Stockton formation has a calculated thickness of approximately 3,000 feet and contains a system of extensive fracturing, generally oriented parallel and perpendicular to the strike of the bedrock units. Fracture sets at the Site (which are parallel to bedrock strike and dip) strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest. General bedrock strike and dip directions are provided in Figure 1.

Groundwater is present both in the overburden soils and in the bedrock beneath the Site. The predominant hydraulic gradient direction in the vicinity of the Chem-Fab facility is to the west toward Cooks Run. The contaminant plume, however, is migrating to the southwest along strike within the bedrock. Site hydrogeology has been divided into three layers: the unconfined overburden aquifer (approximately 5 to 15 feet below ground surface [bgs]); the unconfined shallow bedrock aquifer (approximately 15 to 100 feet bgs); and the semiconfined bedrock aquifer (greater than 100 feet bgs). With respect to the semiconfined bedrock aquifer, the hydraulic gradient runs to the southwest beneath the Site and then turns to the west. Due to the fractured nature of the Stockton Formation, predicting accurate groundwater flow directions is very difficult. It is expected that groundwater does have a southwesterly flow component. The contaminant plume appears to be migrating through fractures and bedding planes.

Groundwater Contamination

A network of ninety-two (92) monitoring wells has been installed by EPA and PADEP to characterize the contamination and hydrogeologic conditions at the Site. Groundwater at the Site contains many of the constituents found in soil at the Property including, among other contaminants, Cr [VI], PCE, TCE, and chemicals associated with the degradation of PCE and TCE. Cr[VI], has been detected at concentrations up to 233,000 ug/L in the groundwater. PCE and TCE have been detected in the groundwater at concentrations up to 4,330 ug/L and 35,000 ug/L, respectively. The compound 1,4-dioxane was detected at a maximum concentration of 40 µg/L. Perfluoroalkyl substances (PFASs) were also detected in the groundwater. Perfluorooctanoic acid (PFOA) has been detected at concentrations up to 0.211 ug/L and perfluorooctane sulfonic acid (PFOS) has been detected at concentrations up to 1.9 ug/L. Table 1 provides a list of all contaminants

detected above screening levels in the groundwater at the Site. Figures 2 to 10 are current plume maps for Cr [VI], PCE, and TCE.

Groundwater contamination extends from the Property in a southwest direction beneath the adjacent self-storage facility and into neighboring properties in Doylestown Township. The groundwater contamination also flows slightly westward in the dip direction towards Cooks Run, which is a tributary of the Neshaminy Creek. Although the highest levels of contamination reside in the overburden and shallow zones, Site-related contamination has appeared in Doylestown Municipal Water Authority Well #13, which is located less than a quarter mile southwest of the Property and was historically pumped in the deeper portion of the aquifer. Additionally, contamination in the overburden layer appears to be discharging in the drainage swale surrounding the adjacent self-storage facility. PADEP previously enclosed the swale to prevent people from coming into contact with the contamination.

Residential Wells

Tenants at the former Chem Fab property rely on the local public water supply for potable water. However, residential and commercial wells exist in areas considered downgradient from the groundwater contamination. In 1987, residential wells in the vicinity of the Property were sampled as part of EPA's PA/SI. Water samples from some of these wells were found to contain significant levels of TCE and PCE. As a result, EPA conducted a Removal Action consisting of the delivery of bottled water and carbon filtration units to affected residences and connection of affected residences to public water supplies in 1987.

In November 2013 and January 2014, EPA collected samples from five residential wells and one commercial well located to the west and southwest of the Site, primarily along West Street and Shady Retreat Road. One of the residential wells was found to be contaminated with TCE above the Maximum Contaminant level (MCL) established under Clean Water Act regulations. No other site-related contamination was found in this well at levels of concern. In May 2014, EPA began providing bottled water to the impacted resident. The resident was subsequently connected to public water in 2015.

EPA collected samples from these residential and commercial wells again in July 2014 and from two additional private wells in September 2014. These samples were analyzed for PFASs. No PFASs were found in these wells above risk-based levels (0.5 ug/L for both PFOS and PFOA).

Municipal Supply Wells

In Doylestown, potable water is obtained by drilling into the bedrock and extracting the groundwater. Doylestown Municipal Water Authority Well #13 (MSW-13) is located within a quarter mile of the Property and was shut down in 2001 to prevent further spread of the contamination. Doylestown Municipal Water Authority Well #8 (MSW-08) is located approximately a half mile downgradient of the Property and continues to be

monitored regularly for contamination. Samples in MSW-08 thus far have not shown levels of contamination which would warrant further response actions.

Indoor Air

In April 2010, a vapor intrusion sampling assessment was conducted by EPA at nine residential properties and one elementary school near the Property. VOCs were not detected in the indoor air samples collected from the elementary school. Five residential properties had detections of VOCs in sub-slab samples. However, no residential properties had detection of VOCs above screening criteria in indoor air samples.

In October 2011 and January 2012, sub-slab and indoor air sampling was conducted in the three buildings located at the former Chem-Fab facility. VOCs were detected in the indoor air of one of the buildings and below the sub-slab of two of the buildings. In August 2012, the indoor air of the largest of the three buildings was reassessed. VOCs were again identified in portions of the building. As a result, EPA initiated a Removal Action intended to reduce VOCs in the building. To accomplish this, EPA installed portable air purifiers into selected suites within the impacted building. EPA then collected additional data to evaluate the efficacy of such units with the existing building vapor mitigation system in reducing VOCs levels within the building.

In July 2015, EPA conducted tests to support the design and construction of a permanent depressurization system to address high VOC concentrations in the sub-slab of the main building on the Property. The depressurization system was constructed in late 2015. In January 2016, sampling was performed to confirm that the treatment system had reduced levels of VOCs in the indoor air and subslab to acceptable levels.

D. SCOPE AND ROLE OF RESPONSE ACTION

This Proposed Plan for interim action addresses the area of highest groundwater contamination (AOHC) within OU2. OU2 consists of contaminated groundwater at the Site. This is an interim remedial action planned for the groundwater impacted at the Chem Fab Site. A final action for OU2 will be proposed following completion of the RI/FS, which addresses all contaminated media, including groundwater, at the Site.

The AOHC corresponds to the former Chem Fab property and the adjacent commercial property to the southwest. Figure 1 shows the location of the former Chem Fab property, adjacent commercial property and the AOHC. The AOHC is based on groundwater data which indicates that the highest groundwater contamination is generally found in monitoring wells on the Property and adjacent commercial property. Contaminant plumes in Figures 2 to 4 show the highest TCE concentrations occurring within the AOHC and just to the south of the AOHC. PCE contaminant plumes also indicate that the highest concentrations are also primarily within the AOHC (Figures 5 to 7). Similarly, contaminant plumes shown in Figures 8 to 10 show the highest hexavalent chromium concentrations occurring within and just to the south of the AOHC.

The interim action for OU2 will specifically address the groundwater within the AOHC located on the Property and the neighboring self-storage facility and will be consistent with subsequent remedial actions which will address all groundwater contamination at the Site.

EPA characterizes waste on-site as either principal threat waste or low-level threat waste. The concept of principal threat waste and low-level threat waste, as developed by EPA in the NCP, 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, to surface water, to air, or that act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile, which would present a significant risk to human health or the environment should exposure occur. Contaminated groundwater is generally not considered to be source material. However, Non-Aqueous Phase Liquids (NAPLs) in groundwater may be considered source material. The presence of NAPLs has not been determined at the Site.

WHAT IS A "PRINCIPAL THREAT" -?

The 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.

E. SUMMARY OF SITE RISKS

Human health and ecological risk assessments are being conducted for the Site as part of the ongoing Remedial Investigation. Table 1 compares detections of contaminants in groundwater with their respective risk-based standards. These standards include EPA's drinking water standards known as Maximum Contaminant Levels (MCLs) (established under the Safe Drinking Water Act, 42 U.S.C. § 300(f) et seq., and 40 C.F.R. Part 141, Subpart G) and Risk-Based Regional Screening Levels (RSLs). The primary contaminants of concern (COCs) include Cr [VI], PCE, TCE, and chemicals associated

with the degradation of PCE and TCE. The designation of these COCs is based on their exceedances of their respective standards for human ingestion which provide the basis for this interim remedial action.

WHAT ARE THE PRIMARY “CONTAMINANTS OF CONCERN”?

EPA and PADEP have identified three primary contaminants of concern, that is, those contaminants that pose the greatest potential risk to human health at the Chem-Fab Site.

Hexavalent Chromium (Cr[VI]): Hexavalent chromium has been detected in groundwater at concentrations up to 233,000 ug/L. The MCL for Chromium is 100 ug/L. Chromium is a metal that is used for many industrial processes, including steel-making and chrome plating. People can be exposed to chromium through breathing, eating or drinking and through skin contact with chromium or chromium compounds. Hexavalent chromium is considered to be the most toxic form of chromium. Short term high level exposure to hexavalent chromium can result in adverse effects at the point of contact, such as ulcers of the skin, respiratory problems, and irritation of the gastrointestinal tract. Hexavalent chromium is a known human carcinogen by the inhalation route of exposure.

Trichloroethene (TCE): Trichloroethene has been detected in groundwater at concentrations up to 35,000 ug/L. The MCL for TCE is 5 ug/L. TCE is a halogenated organic compound historically used as an industrial solvent and a degreaser. Exposure to this compound has been associated with deleterious health effects in humans, including anemia, skin rashes, diabetes, liver conditions and urinary tract disorders. TCE is carcinogenic to humans by all routes of exposure.

Tetrachloroethene (PCE): Tetrachloroethene has been detected in groundwater in concentrations up to 4,330 ug/L. The MCL for PCE is 5 ug/L. PCE is a halogenated organic compound historically used as an industrial solvent and a degreaser. Exposure to PCE has been associated with skin irritation, dizziness, nausea, and liver and kidney damage. PCE is likely to be carcinogenic in humans by all routes of exposure.

EPA has conducted sampling of both private drinking water wells and MSW-08. Based on the results, EPA has determined that the public is not currently being exposed to contamination exceeding EPA’s acceptable risk range. However, the use of MSW-08 has the potential to introduce contamination into the drinking water supply and expose the public to contaminants in the future.

Certain chemicals such as VOCs that are released into the subsurface may form hazardous vapors. Those vapors can be transported through unsaturated soils and eventually enter buildings through cracks or other conduits in basement floors, walls or foundations. This phenomenon is known as vapor intrusion. Groundwater contamination has the potential to expose the public through the vapor intrusion pathway. Residential areas exist to the southwest and west of the Site in the direction of groundwater flow. Continued migration of contamination towards these areas has the potential to increase the risk of vapor intrusion into these homes.

Movement of contaminants from the groundwater to surface water via seeps has the potential to expose human and ecological receptors to contaminants. A forested wetlands

area and creek are situated to the west of the Site, in the direction of groundwater flow. It is unknown to what extent groundwater from the Site discharges to these areas. However, continued uncontrolled migration of contamination has the potential to impact these sensitive ecosystems and receptors located there.

In addition, sampling results indicate the presence of 1,4-dioxane and PFAS in the groundwater within the AOHC. EPA will continue to monitor for these contaminants as part of the ongoing RI/FS to determine if these particular contaminants present a risk to human health or the environment at the Site. The human health and ecological risk assessments to be prepared as part of the ongoing RI/FS will provide a more detailed description of the risks posed by the contamination at the Site. It is the intent of this Proposed Plan to develop an alternative for an interim remedial action that will support future risk management decisions.

F. REMEDIAL ACTION OBJECTIVES

EPA guidance states that “[a]n interim action is limited in scope and only addresses areas/media that also will be addressed by a final site/operable unit ROD.”¹ This interim action is not intended reduce all contamination in all media types at this Site. However, the Remedial Action Objectives (RAOs) are designed to support a final remedial action which will comply with CERCLA requirements for cleanup of contaminated groundwater and restore the groundwater to beneficial use. This interim action is intended solely to address contaminated groundwater within the geographic boundaries of the AOHC. Therefore, the RAOs reflect this limited scope. By addressing contaminated groundwater within the AOHC, the interim action will reduce Site risks by ensuring contamination within the AOHC does not continue to migrate towards locations where it could impact human and ecological receptors including MSW-08, residential areas, and wetlands. The interim action will also begin restoration of the Site groundwater by treating contaminated groundwater from the AOHC, thereby reducing the volume of contaminated groundwater present in the aquifer. These RAOs are designed to support a final remedial action which will entail complete restoration of the aquifer. The RAOs are as follows:

- Prevent further migration of contaminated groundwater from the AOHC, and
- Begin restoration of the groundwater to beneficial use by reducing volume of contaminated groundwater within the AOHC.

The remedial alternatives listed below are limited in scope to solely address these RAOs. Contamination in other media and other Site locations will be addressed separately.

¹ “A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents” (Office of Solid Waste and Emergency Response)(July 1999), at p. 8-2.

G. SUMMARY OF REMEDIAL ALTERNATIVES

The alternatives evaluated below will be designed to meet the RAOs as well as contribute to subsequent remedial actions. The remedial alternatives evaluated for interim action at OU2 are presented below. The Preferred Alternative is Alternative 2, Groundwater Extraction and Treatment with UV Oxidation, Air Stripping, Ion Exchange, and Carbon Adsorption.

Alternative	Description
1	No Action
2	Groundwater Extraction and Treatment with Air Stripping, UV Oxidation, Ion Exchange, and Carbon Adsorption
3	Groundwater Extraction and Treatment with Air Stripping, Photo-Cat, and Carbon Adsorption

Common Elements

Both Alternatives 2 and 3 require extraction of groundwater prior to treatment. To prevent further migration of contaminated groundwater from the AOHC, these alternatives include installation of approximately ten extraction wells with a total anticipated pumping rate of 100 gpm. The exact number, location, depth and pump rate of extraction wells would be determined during the Remedial Design phase. For cost estimating purposes, it is assumed that seven extraction wells would be installed down to 75 feet bgs and three extraction wells to a depth of 50 feet bgs. These depths are based on current knowledge of bedrock geology; however geophysical testing will be needed to determine the final construction depths. Figure 11 provides potential locations of extraction wells. Actual locations would be determined during the remedial design. The extracted water from the unconfined overburden, shallow bedrock, and semiconfined bedrock aquifer would be treated by a groundwater extraction and treatment system (GETS).

For both Alternatives 2 and 3, a treatment building would be constructed to house the necessary equipment to treat the extracted groundwater. Assuming all treatment components are required, the building would need to be 40-feet by 40-feet in plan view and 20 feet tall. The actual components that would be included in the treatment train would be determined during the Remedial Design phase. Potential locations for the treatment building under current consideration are:

- a. The former Chem Fab Property (300-360 N. Broad Street, location “A” on Figure 11): An access road from the adjacent self-storage facility would likely need to be constructed in order to access the treatment system. Approximately ten parking spaces would be covered once the treatment building is constructed.
- b. The southern portion of the adjacent self-storage facility (390 N. Broad Street, location “B” on Figure 11): This area has soft soil, and the land is characterized as forested wetland. Due to these conditions, helical anchor/piles would be

installed to bedrock to support the foundation of the building if this location or similar location were selected.

- c. The field to the west of the self-storage facility (400 N. Broad Street, location “C” on Figure 11): An access road would need to be constructed from North Broad Street to access this location as well.

Common elements of the treatment technologies for Alternatives 2 and 3 include bag filters to remove suspended solids, granular activated carbon (GAC) to remove VOCs and PFASs, and air stripping to remove VOCs, if it is determined that GAC will not cost-effectively remove both VOCs and PFASs.

For both Alternatives 2 and 3, the alternatives assume the treated water would be discharged to Cooks Run. Influent and effluent sampling would be conducted according to National Pollution Discharge Elimination System (NPDES) substantive requirements. Depending on the number of technologies included in the treatment train, additional sampling would be conducted to monitor effectiveness and estimate breakthrough curves. For cost estimating purposes, the frequency of this performance monitoring is assumed to be monthly during the first year of operation and could change to quarterly for the remaining years of operation. A long-term monitoring program would be implemented, which includes an estimated 35 monitoring locations, including the extraction wells that would be sampled semiannually for the first five years of operation and annual monitoring thereafter. These monitoring locations would be divided equally between the unconfined overburden, unconfined shallow bedrock, and semiconfined bedrock aquifer.

Alternative 1: NO ACTION

Consideration of this alternative is required by the NCP and CERCLA. Alternative 1 requires no additional remedial action to be taken at the Site. The No Action alternative serves as a basis against which the effectiveness of all the other proposed alternatives can be compared. Under this alternative, the Site would remain in its present condition, and groundwater contamination would be subject to natural processes only.

Alternative 2: GROUNDWATER EXTRACTION AND TREATMENT WITH AIR STRIPPING, UV OXIDATION, ION EXCHANGE, AND CARBON ADSORPTION

Because of the concentrations of 1,4-dioxane and PFASs relative to potential discharge standards, it is unclear if these constituents will require treatment prior to discharge as part of this interim remedy. While performance standards for discharge will be discussed further in the ROD, information about the influent concentrations of PFASs and 1,4-dioxane will be used to develop site-specific discharge criteria in accordance with the Pennsylvania Clean Streams Law and Section 402 of the CWA during the remedial design. Figure 12 illustrates three different scenarios depending on which constituents need treatment. These changes of the treatment train will have a significant impact on the

capital and operation and maintenance (O&M) cost of the GETS. To offer a fair comparison with Alternative 3, the cost estimate for this alternative assumes that all Site COCs will require treatment. Testing during design and initial system operation will determine if treatment components targeting specific COCs can be eliminated or bypassed. The following sections describe the different scenarios depending on the contaminants that will need to be treated.

Scenario 1: UV Oxidation, Ion Exchange, GAC

This scenario assumes treatment for VOCs, 1,4-dioxane, Cr (VI) and PFASs (Figure 12). Within the treatment system, the extracted water would initially go through bag filters to remove suspended solids. A UV oxidation system would then be used to treat 1,4-dioxane. A UV oxidation system designed to provide the necessary treatment for 1,4-dioxane would also reduce the VOC concentrations and potentially reduce PFASs concentrations without reducing 1,4-dioxane treatment efficiency. However, the reductions of these constituents would likely not be sufficient to meet the VOC and PFASs discharge criteria. Although a more robust UV oxidation system can be designed to completely treat the VOCs and improve PFASs removal, the remaining VOCs and PFASs would likely be more efficiently treated by carbon adsorption. The concentrations of VOCs and PFASs, however, would be significantly reduced, decreasing the chemical loading on the treatment components for VOCs and PFASs.

After passing through the UV oxidation system, the water would run through an ion exchange system to treat the hexavalent chromium.

To treat the remaining VOC and PFASs, liquid-phase GAC vessels would be installed to treat the water effluent from the ion exchange units. The rationale for installing the GAC vessels after the removal of hexavalent chromium would be to eliminate the potential contamination of GAC with chromium because chromium-contaminated GAC could not be reactivated and would have to be sent to a Resource Conservation and Recovery Act (RCRA)-permitted facility for disposal. Based on design of systems at sites with similar contamination, treatment of PFASs by GAC requires a longer contact time than other contaminants typically treated with GAC. As such, the size of the GAC vessels may be comparatively larger than a typical system. During the remedial design, an accelerated column test (ACT) can be conducted with Site groundwater to determine the effect of Site-specific water quality on PFAS removal, the effect of TCE treatment on PFAS removal, and appropriate GAC vessel dimensions.

Scenario 2: Air Stripper, Ion Exchange, GAC

If additional study during the design stage concludes that treatment of 1,4-dioxane will not be necessary, the UV oxidation system can be removed from the treatment train. Therefore this scenario assumes only VOCs, Cr(VI), and PFASs will require treatment (Figure 12). However, without the presence of the UV oxidation system, the GAC will likely receive higher VOC concentrations. This scenario assumes that the GAC would not be able to simultaneously treat PFASs and VOCs to attain the potential discharge

criteria. As a result, this scenario includes a low-profile air stripper or tray aerator to treat VOCs at the head of the treatment plant after the bag filters. The blower and transfer pump would be designed to handle the anticipated influent rate and VOC mass loading. If necessary, the off-gas from the air stripper would be treated using vapor-phase GAC vessels.

Scenario 3: Ion Exchange, GAC

This scenario assumes, like Scenario 2, that the UV oxidation system will not be required for treatment of 1,4-dioxane. Therefore this scenario assumes only VOCs, Cr(VI), and PFASs will require treatment (Figure 12). The difference between this scenario and Scenario 2 is that this scenario assumes that the GAC would be able to simultaneously treat VOCs and PFASs. Additionally, if PFASs do not require treatment, it is likely that only GAC would be needed to treat the VOCs. As a result, the air stripper would not be needed, and the treatment system could consist of ion exchange and GAC.

Alternative 3: GROUNDWATER EXTRACTION AND TREATMENT WITH AIR STRIPPING, PHOTO-CAT, AND CARBON ADSORPTION

To provide a fair comparison between this alternative and Alternative 2, this alternative assumes that 1,4-dioxane and PFASs will not meet the discharge criteria and will require treatment. This is the same assumption as in Alternative 2, Scenario 1. Testing during design and initial system operation will determine if treatment components specific to these parameters can be eliminated or bypassed based on discharge criteria and influent concentrations.

Alternative 3 implements a different technology to treat 1,4-dioxane and hexavalent chromium. A Photo-Cat system is designed to achieve lower treatment levels for hexavalent chromium than typical ion exchange systems. This system would require a comprehensive pilot test to evaluate hexavalent chromium treatment efficiency for Site-specific water. Water from the air stripper would run through the Photo-Cat platform. On the Photo-Cat platform, citric acid would be injected into the water to facilitate the reaction. The water would then be mixed with titanium dioxide (TiO₂) and passed through tubes that would expose the water to UV light. The UV light would activate the TiO₂, which would oxidize the citric acid and 1,4-dioxane and use the removed electrons to reduce the hexavalent chromium to trivalent chromium. The trivalent chromium would then adsorb onto the TiO₂.

The water would then pass through two cross-flow filters that would separate the flow stream from the TiO₂. The treated water would exit the Photo-Cat system and be discharged to Cooks Run. The separated TiO₂ slurry would return to the TiO₂ accumulation tank and be reused to treat incoming water. A slipstream of the TiO₂ would continuously be removed. This material would enter the vessels, where the TiO₂ would be dewatered and concentrated. Once the level of TiO₂ in these vessels had reached preset levels, the TiO₂ cleaning process would begin. Heated sulfuric acid would then be added and agitated to remove the adsorbed chromium. Water would be added to the

vessels, agitated, and pushed out to remove any residual chromium and acid. The cleaned TiO₂ would be returned to TiO₂ storage tank for reuse. The residual acid and water would enter the chrome recovery tank. Sodium hydroxide would be added to this tank to neutralize the pH. This would cause the trivalent chromium to precipitate out as chromium hydroxide, which would be removed from the system as a slurry into a drum for off-Site disposal.

Although the treatment of VOCs can be addressed by the selected treatment technology for hexavalent chromium (Photo-Cat), the presence of VOCs would decrease the efficiency of the Photo-Cat system in treating hexavalent chromium. Therefore, a low profile stripper to treat the VOCs would be included in this alternative as the first step of the treatment train after the bag filters. If necessary, a vapor-phase carbon unit would treat the off-gas from the air stripper.

H. EVALUATION OF ALTERNATIVES

In this section, the remedial alternatives summarized above are compared to each other using the criteria set forth in 40 C.F.R. § 300.430(e)(9)(iii). In the remedial decision-making process, EPA profiles the relative performance of each alternative against the evaluation criteria, noting how each compares to the other options under consideration. A detailed analysis of alternatives can be found in the Focused Feasibility Study, which is in the Administrative Record file for the Site.

These evaluation criteria relate directly to requirements of Section 121 of CERCLA, 42 U.S.C. § 9621, for determining the overall feasibility and acceptability of a remedy. The nine criteria fall into three groups described as follows:

Threshold criteria must be satisfied in order for a remedy to be eligible for selection.

Primary balancing criteria are used to weigh major tradeoffs between remedies.

Modifying criteria are formally taken into account after public comment is received on the Proposed Plan.

Evaluation Criteria for Superfund Remedial Alternatives	
<i>Threshold Criteria</i>	1. Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
	2. Compliance with 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.
<i>Primary Balancing Criteria</i>	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 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, residents, 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 of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
<i>Modifying Criteria</i>	8. State/ Support Agency Acceptance considers whether the State agrees with EPA's analyses and recommendations, as described in the FFS 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.

Detailed Analysis of Proposed Remedial Alternatives

1. Overall Protection of Human Health and the Environment

Alternative 1 (No Action) does not include measures to prevent current and future receptors from use of contaminated groundwater. While a human health and ecological risk assessment has not been completed, comparison of contaminants detected in the groundwater with risk-based standards suggests that several contaminants would present unacceptable risk if human receptors were exposed to the contaminated groundwater. If action is not taken, contaminated groundwater could potentially be drawn into public water supplies and expose the public to unacceptable levels of Site-related contaminants. Movement of contaminants from the groundwater to surface water via seeps has the potential to also expose human and ecological receptors to contaminants if no action is taken. Therefore, under the No Action alternative, contaminated groundwater will be allowed to continue to migrate in the aquifer, potentially impacting downgradient receptors. Therefore, this alternative would not be protective of human health and the environment. Because the No Action alternative would not be protective of human health

and the environment and fails the threshold criteria, it is eliminated from further consideration under the remaining eight criteria.

Both Alternatives 2 and 3 would provide adequate protection of human health and the environment by treating contaminated groundwater within the AOHC and preventing the migration of contaminated groundwater through the operation of the GETS. By eliminating migration of the highest levels of contamination from the AOHC, Alternatives 2 and 3 would prevent contamination within the AOHC from impacting downgradient pathways and receptors, including MSW-08, residential properties, and ecological receptors.

2. Compliance with ARARs

To meet the requirements of Section 121(d) of CERCLA, remedial actions (RAs) must comply with applicable or relevant and appropriate requirements (ARARs) unless a waiver is justified. ARARs are used to help determine the appropriate extent of Site cleanup, to develop RA alternatives, and to govern the implementation of a selected response action.

Section 121(d)(4)(A) of CERCLA provides that EPA may select an action that does not meet an ARAR if the selected action “is only part of a total remedial action that will attain such level or standard of control when completed.” The proposed action is an interim RA and will be part of a total RA for contaminated groundwater at the Site. While the final RA will seek to restore the aquifer to beneficial use, this interim action seeks limited action to prevent migration of contaminated groundwater and reduce the volume of contaminated groundwater. The proposed interim action will support the final RA. The final RA will be selected to address risks presented by the remaining contaminated groundwater at the Site.

Groundwater cleanup levels will be selected in the final ROD for OU2 as performance standards for restoration of the aquifer. Because this is an interim action which does not seek complete restoration of the aquifer, EPA is waiving, and this interim RA will not meet, ARARs establishing groundwater cleanup standards. These requirements are waived in this interim Remedial Action pursuant to the interim action waiver set forth in Section 121(d)(4)(A) of CERCLA and 40 CFR § 300.430(f)(1)(ii)(C)(1).

For Alternatives 2 and 3, all the components of the groundwater extraction system would comply with Federal and State ARARs that have not been waived as required under Section 121(d) of CERCLA, 42 U.S.C. § 9621(d).

Major ARARs include:

- Section 402 of the Clean Water Act, 33 U.S.C. § 1342, and substantive requirements of relevant portions of 40 C.F.R. Parts 122 and 125, governing the establishment of limits on the discharge of contaminants to surface water from groundwater extraction and treatment.

- 40 C.F.R. Part 6, Appendix A and Executive Order No. 11,990 requiring the avoidance of adverse impacts from the destruction or loss of wetlands.

ARARs will be described in further detail in the OU2 Interim ROD.

3. Long Term Effectiveness and Permanence

For both Alternatives 2 and 3, groundwater treatment is expected to achieve high long-term effectiveness and permanence assuming it is properly maintained. The proposed components of the GETS have been utilized at sites with the same COCs at similar concentrations. If 1,4-dioxane or PFASs concentrations are above discharge criteria, then technologies included in this alternative can adequately and permanently address this issue. The GETS, as currently envisioned, would be effective in reducing the contaminant mass within the AOHC and controlling plume migration. GETS operation would require continued maintenance.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

For both Alternatives 2 and 3, the GETS would control the mobility of the contaminants by extracting contaminated groundwater, and by establishing hydraulic capture. The contaminated water would be treated by oxidization of organic contaminants, ion exchange, and carbon adsorption, thereby reducing the toxicity and volume of the contaminants in groundwater.

5. Short-Term Effectiveness

For both Alternatives 2 and 3, the GETS would pose short-term impacts to the surrounding community due to increased vehicle traffic and noise during drilling and construction activities. It is anticipated that construction activities would last less than one year. Proper controls during installation of extraction wells would minimize the risks of the community being exposed to dust and potential VOC vapors. If the GETS is located in a wetlands area, erosion and sediment controls would be used to mitigate runoff and minimize damage to the wetlands. A site-specific health and safety plan would specify how workers would be protected against potential dermal contact and inhalation of vapors during construction of extraction wells and operation of the treatment plant. Site workers would be protected from these potential exposures through the use of proper personal protective equipment (PPE) and proper workplace safety procedures. It is anticipated that there would not be a detrimental effect to the community from the increased noise or the increased road traffic during the drilling and construction activities. Minimal effort would be required to establish and enforce exclusion zones during Site work. Exposure to VOCs from emissions would be mitigated by the off-gas GAC system.

6. Implementability

Alternative 2 is more implementable than Alternative 3 for the following reasons. For Alternative 2, all the materials and services needed for the GETS are standard and are

readily available from multiple vendors. For alternative 3, the Photo-Cat system is provided by one vendor. As a result, work backlog or other factors affecting this one vendor could negatively affect project implementability. The Photo-Cat technology also has many moving parts and controls, which could result in multiple points of failure that could impact system startup and operation. Also, because Alternative 2 utilizes separate technologies to treat 1,4-dioxane and Cr(VI), it has the flexibility to potentially avoid treatment of 1,4-dioxane, which would simplify the treatment train and make it more easily implementable. Alternative 3 would require the use of the Photo-Cat technology to treat Cr(VI) even if 1,4-dioxane does not require treatment. Once the Photo-Cat system is configured, commissioned, and fully automated, it is anticipated that operation of Alternative 3 would be less labor intensive than Alternative 2.

Long-term access would be needed if the treatment plant is located off the Property. Obtaining such access would be a challenging component to building the treatment system for both Alternative 2 and 3. Another challenging component of both Alternatives 2 and 3 is the construction of the water treatment building on the soft soils of the forested wetland if that location is chosen. A proven technology (helical piers) would be used to overcome this technical issue. Construction of an access road to the GETS would also be necessary for both Alternatives 2 and 3, depending on the location of the treatment system. Timing and interfacing of different technologies are significant factors, and the installation of each unit by separate contractors would have to be coordinated and supervised. As stated in the previous paragraph, this may adversely affect the implementability of Alternative 3.

The approximate time to construct both Alternatives 2 and 3 is one year after the design has been completed, contingent on Photo-Cat availability. During the design phase bench-scale studies and other Site investigations would be conducted to assist in the design of the extraction system and treatment train and documented in a comprehensive report.

7. Cost

Cost information for Alternatives 2 and 3 is presented below. Detailed cost estimates and associated assumptions are included in the FFS, using a 7% discount rate.

Alternative	Description	Capital	Annual O&M	Present Worth
2	Groundwater Extraction and Treatment with Air Stripping, UV Oxidation, Ion Exchange, and Carbon Adsorption	\$1,619,000	\$609,000 for the first four years, \$562,000 afterwards	\$8,111,000
3	Groundwater Extraction and Treatment with Air Stripping, Photo-Cat, and Carbon Adsorption	\$2,190,000	\$638,000 for the first four years, 591,000 afterwards	\$8,972,000

8. State Acceptance

The Commonwealth of Pennsylvania is expected to concur with EPA's proposed Preferred Alternative, as set forth below. State comments and EPA's response to any such comments will be available in the Responsiveness Summary section of the Interim ROD.

9. Community Acceptance

EPA will evaluate community acceptance of the Preferred Alternative after the public comment period ends. Community comments and EPA's response to any such comments will be available in the Responsiveness Summary section of the Interim ROD.

I. PREFERRED ALTERNATIVE

The Preferred Alternative for interim action of OU2 at the Chem Fab Site is Alternative 2, Groundwater Extraction and Treatment with Air Stripping, UV Oxidation, Ion Exchange, and Carbon Adsorption. Alternative 2 is preferred because it is considered more implementable than Alternative 3 and costs less.

Alternative 2 is considered more implementable than Alternative 3 because all the materials and services needed for the GETS are standard and are readily available from multiple vendors. Also, because Alternative 2 utilizes separate technologies to treat 1,4-dioxane and Cr(VI), it has the flexibility to potentially avoid treatment of 1,4-dioxane, which would simplify the treatment train and make it more easily implementable. The capital costs and operation and maintenance costs for Alternative 2 are less than for Alternative 3.

Alternative 2 would prevent further migration of contaminated groundwater from the AOHC and would begin restoring the groundwater to beneficial use by reducing the volume of contaminated groundwater within the AOHC.

Groundwater contamination from the Site has the potential to impact a public water supply well, residential homes via vapor intrusion, and ecological receptors in a downgradient wetland. By extracting and treating groundwater within the AOHC, Alternative 2 would prevent further migration of contamination towards these locations and receptors. Alternative 2 would comply with ARARs that are not waived for this interim action. Alternative 2 also would provide a high degree of long-term effectiveness and permanence by removing and treating groundwater and would reduce the mobility and volume of contaminated groundwater through treatment. Alternative 2 would pose short-term impacts to the surrounding community due to increased vehicle traffic and noise from treatment during drilling and construction activities. However, proper engineering and administrative controls during installation of extraction wells and construction of the GETS would minimize the risks of workers and the community being

exposed to dust and VOC vapors. Erosion and sediment controls would be used to mitigate runoff and minimize damage to the wetlands.

Statutory Determination

Based on the information available at this time, EPA believes the Preferred Alternative (Alternative 2: Groundwater Extraction and Treatment with Air Stripping, UV Oxidation, Ion Exchange, and Carbon Adsorption) meets the threshold criteria and provide the best balance with respect to the balancing criteria. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA § 121: 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element.

J. COMMUNITY PARTICIPATION

EPA encourages the public to gain a more comprehensive understanding of the Chem-Fab Site and the action proposed in this Proposed Plan and to submit comments for consideration by EPA. A public comment period will open October 1, 2016 and close October 31, 2016. All comments must be postmarked by October 31, 2016. Written comments, questions about the Proposed Plan or public meeting, and requests for information can be sent to:

Huu Ngo (3HS21)
Remedial Project Manager
Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3187
ngo.huu@epa.gov

Larry Johnson (3HS52)
Community Involvement Coordinator
Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3239
johnson.larry-c@epa.gov

Public Meeting – A public meeting will be held to discuss the Proposed Plan on October 18, 2016 from 6:30 p.m. to 8:30 p.m. The public meeting will be held at Doylestown Borough Hall, 57 West Court Street, Doylestown, PA 18901.

It is important to note that although EPA is proposing a Preferred Alternative for interim action for OU2 at the Site, EPA has not yet selected the final interim action for OU2 for the Site. All relevant comments received will be considered and addressed by EPA before the final interim action for OU2 is selected for the Site.

Detailed information on the material discussed herein may be found in the Administrative Record file for the Site, which includes the Focused Feasibility Study and other

information used by EPA in the decision-making process. EPA encourages the public to review the Administrative Record file in order to gain a more comprehensive understanding of the Site and the Superfund activities that have taken place there. Copies of the Administrative Record file are available for review at <http://go.usa.gov/xK4CB>, or at the following locations:

Bucks County Free Library
150 South Pine Street
Doylestown, PA 18901
(215) 348-9081

EPA Administrative Records Room,
Attention: Administrative Coordinator
1650 Arch Street
Philadelphia, PA
(215) 814-3157
Hours: Monday through Friday, 8:00am
to 4:30pm; by appointment only.

Following the conclusion of the public comment period on this Proposed Plan, EPA, in consultation with PADEP, will select an interim remedy for OU2 after reviewing and considering all information submitted during the 30-day public comment period. EPA, in consultation with PADEP, may modify the Preferred Alternative or select another response action presented in this Proposed Plan based on new information or public comments.

EPA will prepare a Responsiveness Summary which will summarize and respond to comments received during the public comment period. EPA will then prepare a formal decision document, the ROD for interim action, which selects the interim remedial action for the Site. The ROD will include the Responsiveness Summary. Copies of the ROD for interim action will be available for public review in the Administrative Record following finalization of the ROD.

Tables

Table 1
Identification of Groundwater COPCs and Maximum Detected Concentrations

Chemical	Screening Value (µg/L)	Basis	Maximum Historical Value Detected (µg/L)	Well ID Maximum Detection	Date
1,1,1-Trichloroethane	200	Drinking Water MCL	1320	SB-05	1/5/2000
1,1,2,2-Tetrachloroethane	0.076	Tapwater RSL	3	MW-05	9/10/2002
1,1,2-Trichloroethane	0.041	Tapwater RSL	10	MW-05	9/10/2002
1,1-Dichloroethane	7	Drinking Water MCL	280	MW-16	5/6/2002
1,1-Dichloroethane	2.8	Tapwater RSL	148	SB-34	1/13/2000
1,2-Dichlorobenzene	30	Tapwater RSL	45.1	SB-05	1/5/2000
1,2-Dichloroethane	0.17	Tapwater RSL	13	OW-09	1/13/2014
1,4-Dichlorobenzene	0.48	Tapwater RSL	5.09	SB-13	1/6/2000
Benzene	0.46	Tapwater RSL	8	MW-05	9/10/2002
Bromodichloromethane	0.13	Tapwater RSL	3	MW-05	9/10/2002
Carbon tetrachloride	0.46	Tapwater RSL	13	MW-14	9/19/2007
Chloroform	0.22	Tapwater RSL	160	MW-04	9/17/2002
cis-1,2-Dichloroethene	3.6	Tapwater RSL	6740	SB-05	1/5/2000
Ethylbenzene	1.5	Tapwater RSL	1260	SB-05	1/5/2000
Methylene chloride	5	Drinking Water MCL	9700	MW-04	5/16/2002
o-Xylene	19	Tapwater RSL	530	MW-04	7/9/2003
Tetrachloroethene	4.1	Tapwater RSL	4330	SB-05	1/5/2000
Toluene	110	Tapwater RSL	604	SB-05	1/5/2000
Trans-1,2-Dichloroethene	36	Tapwater RSL	90	MW-05	5/14/2002
Trans-1,3-Dichloropropene	0.47	Tapwater RSL	50	SB-04	1/4/2000
Trichloroethene	0.28	Tapwater RSL	35000	MW-04	9/17/2002
Vinyl Chloride	0.019	Tapwater RSL	56	SB-04	1/4/2000
Xylenes	19	Tapwater RSL	6700	SB-05	1/5/2000
1,4-dioxane	0.78	Tapwater RSL	40	MW-16	9/21/2007
Naphthalene	0.17	Tapwater RSL	69.6	SB-05	1/5/2000
Aluminum	2000	Tapwater RSL	4080	MW-07	1/8/2002
Antimony	0.78	Tapwater RSL	842	MW-07	1/8/2002
Arsenic	0.052	Tapwater RSL	160	MW-04	8/11/2004
Barium	380	Tapwater RSL	8640	MW-10	8/12/2004
Beryllium	2.5	Tapwater RSL	47.2	MW-07	1/8/2002
Cadmium	0.92	Drinking Water MCL	23.8	MW-07	1/8/2002
Chromium	0.035	Tapwater RSL	240000	MW-04	9/17/2002
Hexavalent chromium	0.035	Tapwater RSL	233000	MW-04	5/16/2004
Cobalt	0.6	Tapwater RSL	5170	MW-07	1/8/2002
Copper	80	Tapwater RSL	5600	SB-05	1/5/2000
Iron	1400	Tapwater RSL	55100	DW	1/9/2002
Lead	15	Drinking Water MCL	339	SB-13	1/6/2000
Manganese	43	Tapwater RSL	35800	MW-10	7/6/2001
Mercury	0.063	Tapwater RSL	1.3	MW-04	5/16/2002
Nickel	39	Tapwater RSL	13500	MW-07	1/8/2002
Selenium	10	Tapwater RSL	24.7	MW-04	5/16/2002
Silver	9.4	Tapwater RSL	16.8	MW-04	4/22/2010
Thallium	0.02	Tapwater RSL	63.8	MW-03	10/24/2001
Vanadium	8.6	Tapwater RSL	82.1	OW-05	4/15/2009
Zinc	600	Tapwater RSL	1490	MW-07	1/8/2002
Perfluorooctanic acid (PFOA)	0.2	Risk-Based Screening Level*	0.211	MW-45	12/9/2015
Perfluorooctane sulfonic acid (PFOS)	0.2	Risk-Based Screening Level**	1.9	MW-40A	1/14/2014

Notes:

µg/L – micrograms per liter

COPC – contaminant of potential concern

MCL – Maximum Contaminant Level

RSL – regional screening level (November 2015)

*Based on Hazard Index of 0.5 and Reference Dose from May 2016 EPA Office of Drinking Water Health Advisory for PFOA

**Based on Hazard Index of 0.5 and Reference Dose from May 2016 EPA Office of Drinking Water Health Advisory for PFOS

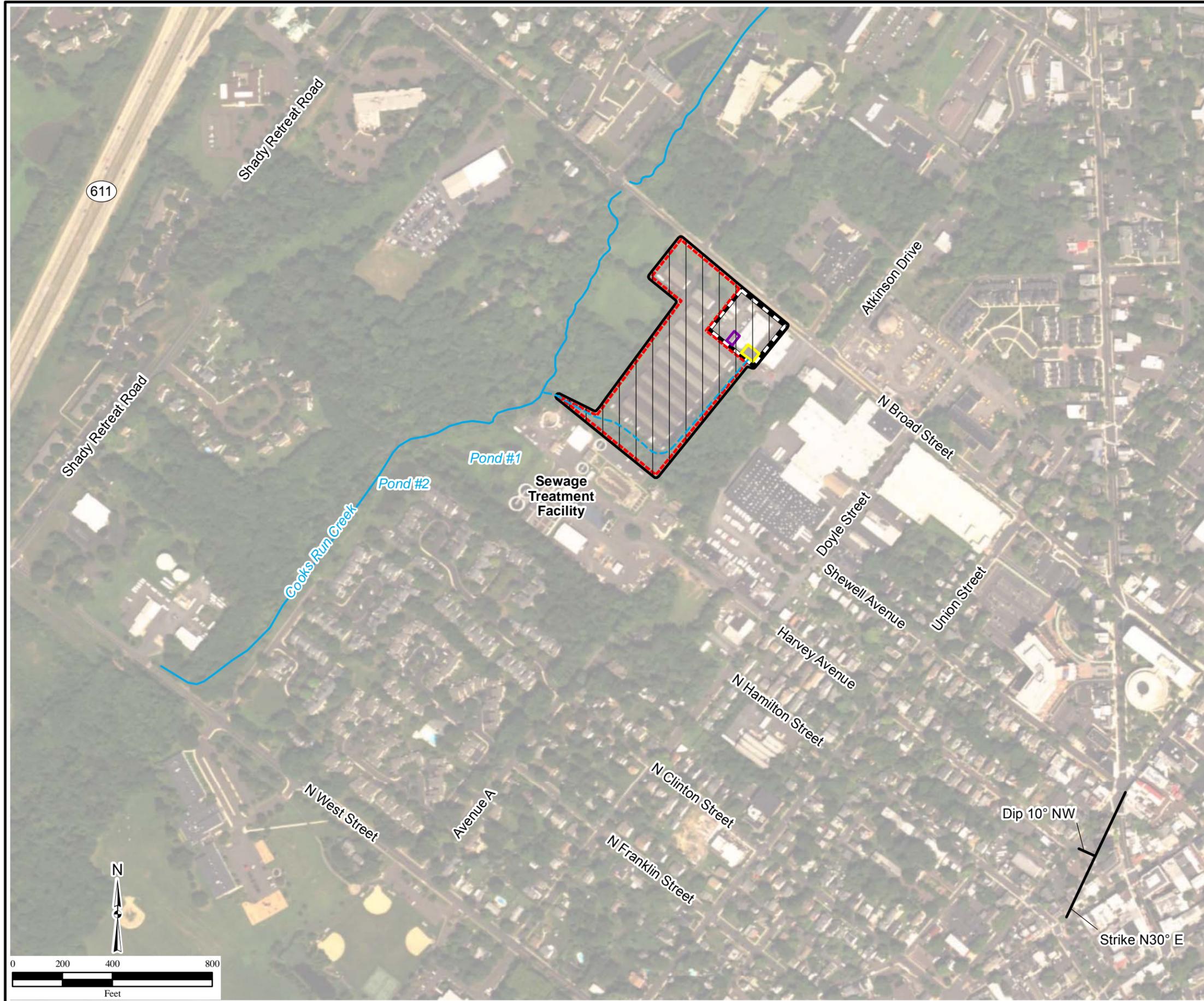
SB - groundwater sample collected from temporary piezometer

OW - groundwater sample collected from monitoring well screened in the overburden

MW - groundwater sample collected from monitoring well screened in bedrock

Figures

**Figure 1
Site Layout**



Legend

- Drainage Ditch
- Creek
- Area of Highest Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

AST=aboveground storage tank
UST=underground storage tank

\\Gst-srv-01\HGLGIS\Chem-Fab\MSIW\FFS\
(1-02)Site_Layout.mxd
9/21/2016 TB
Source: HGL, URS, EA, AECOM
ESRI Online Aerial Imagery



Figure 2
January/February 2014
TCE
Unconfined Overburden Groundwater
Isoconcentration Contours



Legend

- UO Monitoring Well
- Drainage Ditch
- Creek
- Well Identification
TCE Concentration (µg/L)
- TCE Concentration Contour (µg/L)
(dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

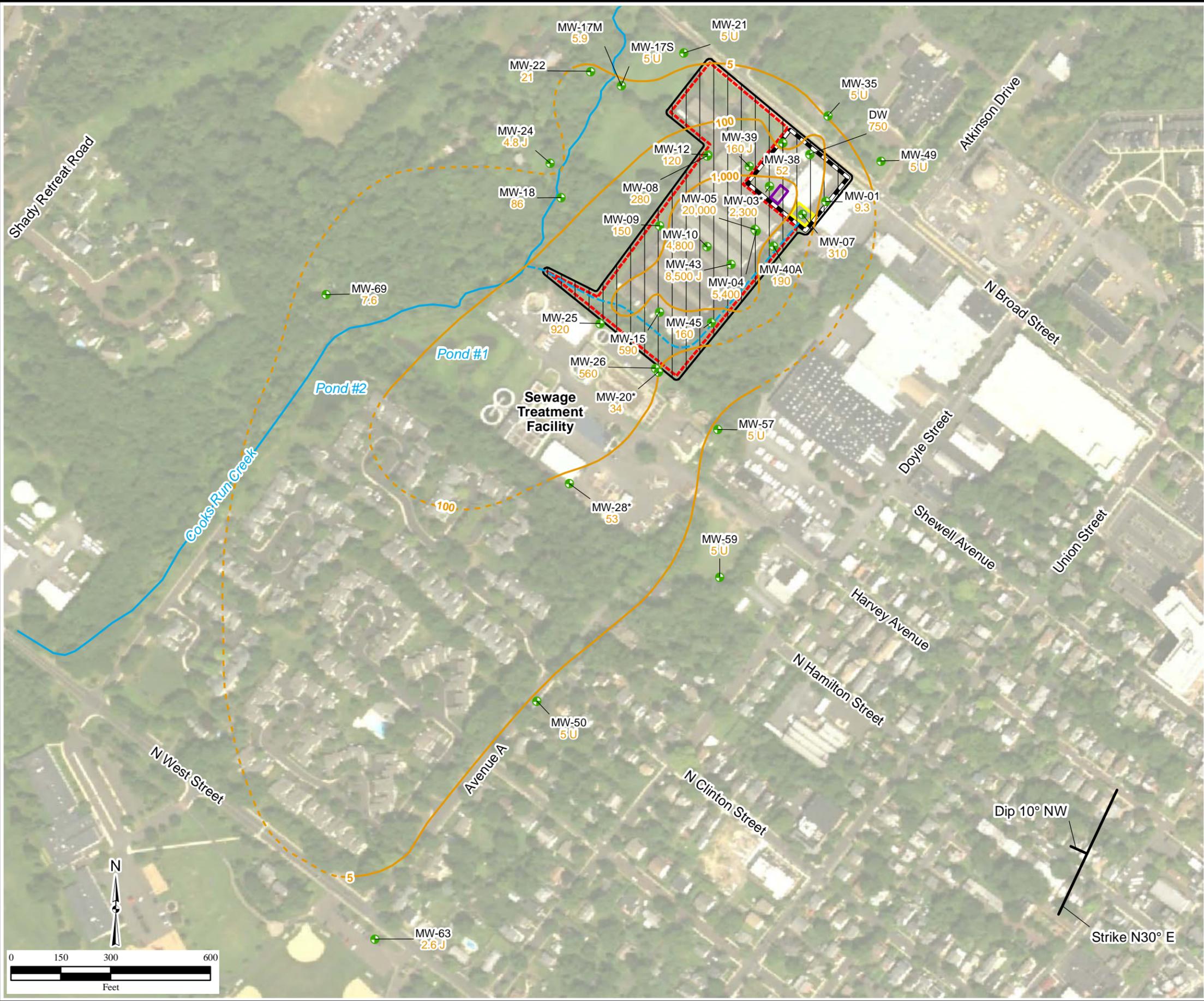
Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

*=data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
TCE=trichloroethene
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UO=unconfined overburden
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\
(1-06)Jan-Feb_TCE_Unconf_Overburden.mxd
8/31/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 3
January/February 2014
TCE
Unconfined Shallow
Bedrock Groundwater
Isoconcentration Contours



Legend

- USB Monitoring Well
- Drainage Ditch
- Creek
- MW-01
9.3 Well Identification
TCE Concentration (µg/L)
- TCE Concentration Contour (µg/L)
(dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

*=data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
J=The result is an estimate quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
TCE=trichloroethene
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
USB=unconfined shallow bedrock
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\1-07\Jan-Feb_TCE_Unconf_Shallow_Bedrock.mxd
8/31/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery




Figure 4
January/February 2014
TCE
Semiconfined Bedrock Groundwater
Isoconcentration Contours



Legend

- SC Monitoring Well
- Drainage Ditch
- Creek
- MW-02
70 Well Identification
TCE Concentration (µg/L)
- 100 TCE Concentration Contour (µg/L)
(dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

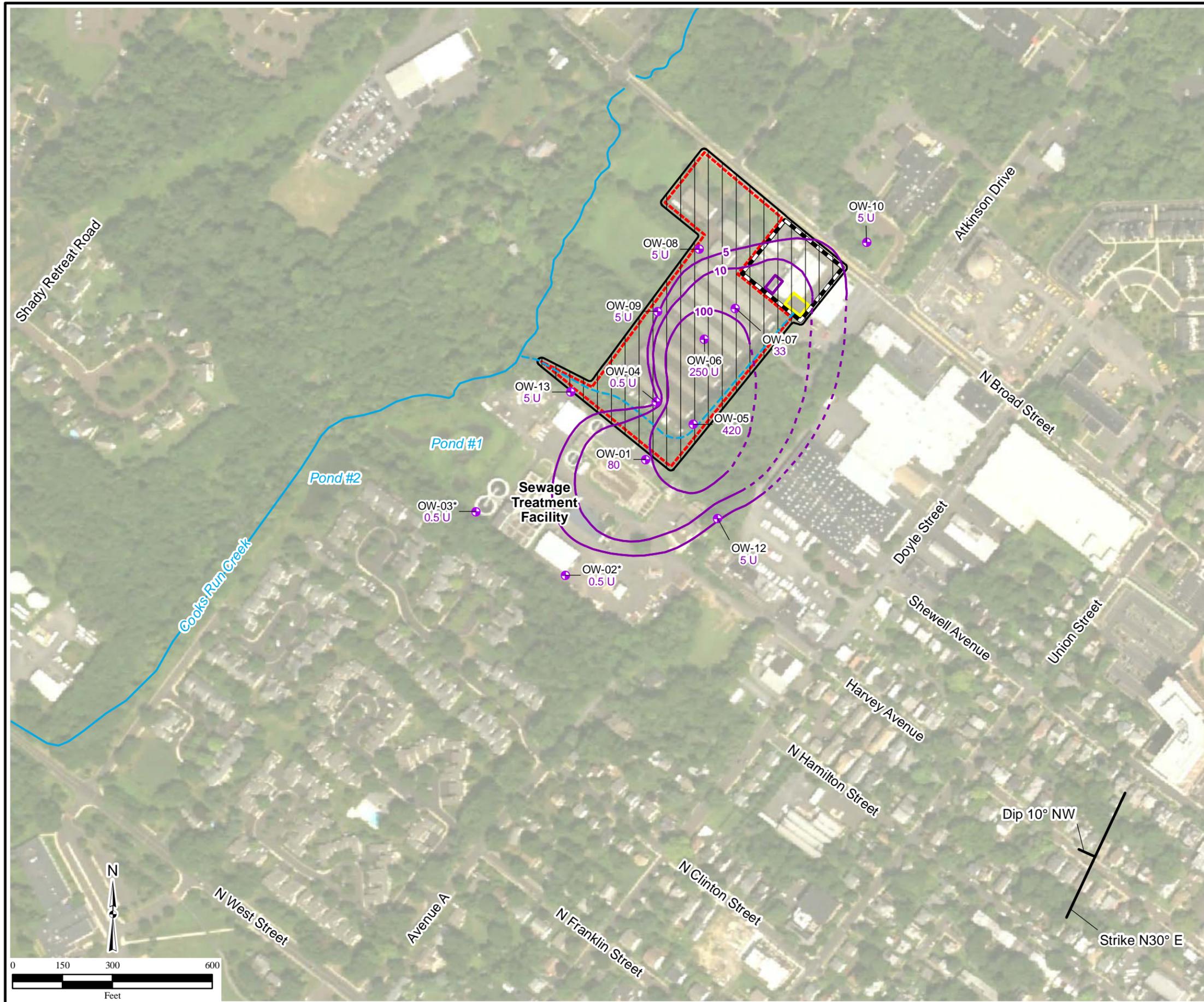
Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

*Data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
J=The result is an estimate quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
L=The analyte was detected, but the result may be biased low.
SC=semiconfined bedrock
TCE=trichloroethene
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS
(1-08)Jan-Feb_TCE_Semi-Confined_Bedrock.mxd
8/31/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 5
January/February 2014
PCE
Unconfined Overburden Groundwater
Isoconcentration Contours



Legend

- UO Monitoring Well
- Drainage Ditch
- Creek
- Well Identification
PCE Concentration (µg/L)
- PCE Concentration Contour (µg/L)
(dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000 Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

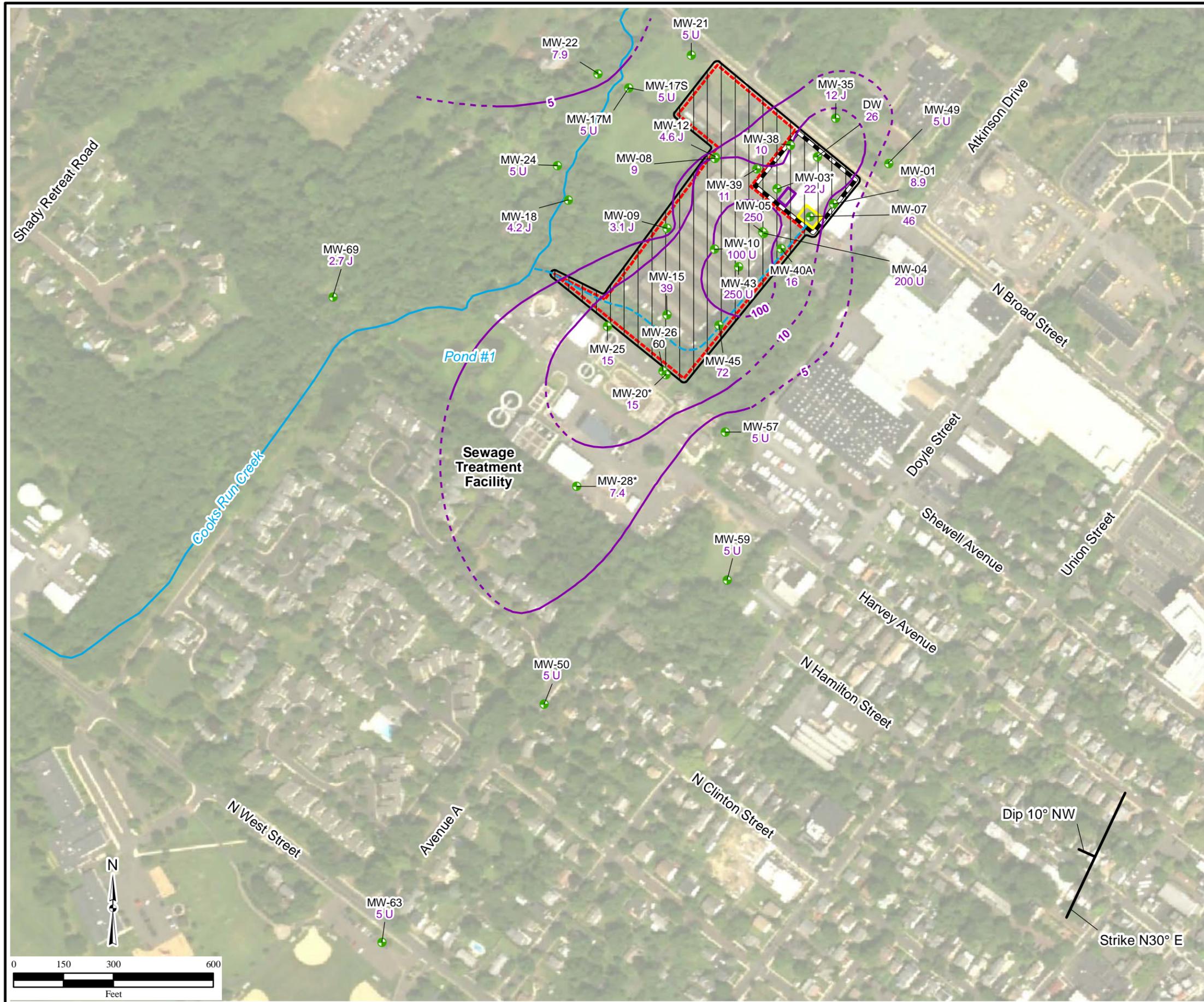
Notes:
Bedrock fracture sets strike from northeast to southwest
(approximately N30°E), with a dip of approximately
10 degrees to the northwest.

*=data from April 2010.
µg/L=microgram per liter
AST=aboveground storage tank
PCE=tetrachloroethene
U=The analyte was analyzed for, but was not detected at a level
greater than or equal to the level of the adjusted Contract
Required Quantitation Limit (CRQL) for sample and method.
UO=unconfined overburden
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\
(1-09)Jan-Feb_PCE_Unconf_Overburden.mxd
8/31/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 6
January/February 2014
PCE
Unconfined Shallow
Bedrock Groundwater
Isoconcentration Contours



Legend

- USB Monitoring Well
- Drainage Ditch
- Creek
- MW-04
200 U Well Identification
PCE Concentration (µg/L)
- 100- PCE Concentration Contour (µg/L)
(dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000 Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

*=data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
J=The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
PCE=tetrachloroethene
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
USB=unconfined shallow bedrock
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\
(1-10)Jan-Feb_PCE_Unconf_Shallow_Bedrock.mxd
8/31/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 7
January/February 2014
PCE
Semi-Confined Bedrock Groundwater
Isoconcentration Contours



Legend

- SC Monitoring Well
- Drainage Ditch
- Creek
- MW-02
20 Well Identification
PCE Concentration (µg/L)
- PCE Concentration Contour (µg/L)
(dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000 Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

Notes:
Bedrock fracture sets strike from northeast to southeast (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

*=data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
J=The result is an approximate quantity. The associate numerical value is the approximate concentration of the analyte in the sample.
L=The analyte was detected, but the result may be biased low.
PCE=tetrachloroethene
SC=semi-confined bedrock
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\
(1-11)Jan-Feb_PCE_Semi-Confined_Bedrock.mxd
8/31/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 8
January/February 2014
Hexavalent Chromium
Unconfined Overburden Groundwater
Isoconcentration Contours



Legend

- UO Monitoring Well
- Drainage Ditch
- Creek
- Well Identification
Hexavalent Chromium Concentration (µg/L)
- Hexavalent Chromium Concentration Contour
(µg/L, dashed where inferred)
- Area of Highest Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

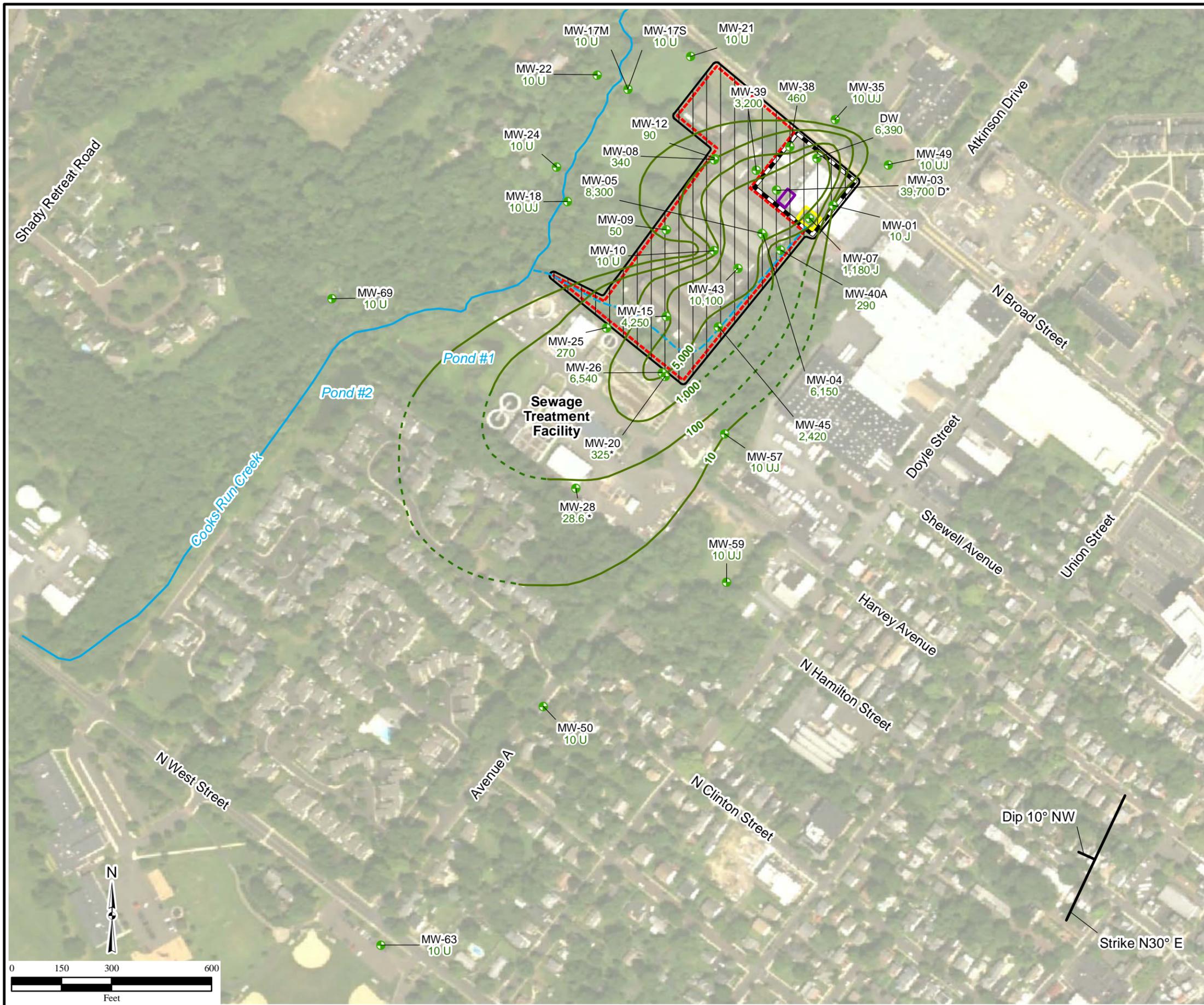
Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10 degrees to the northwest.

*=data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UO=unconfined overburden
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\1-15\Jan-Feb_HexChrom_Unconf_Overburden.mxd
9/1/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 9
January/February 2014
Hexavalent Chromium
Unconfined Shallow
Bedrock Groundwater
Isoconcentration Contours



Legend

- USB Monitoring Well
- Drainage Ditch
- Creek
- MW-01 10 J Well Identification
Hexavalent Chromium Concentration (µg/L)
- Hexavalent Chromium Concentration Contour (µg/L, dashed where inferred)
- Area of Highest Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility

Notes:
Bedrock fracture sets strike from northeast to southwest (approximately N30°E), with a dip of approximately 10° to the northwest.

*=data from April 2010
µg/L=microgram per liter
AST=aboveground storage tank
J=The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
U=The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UJ=The analyte was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
USB=unconfined shallow bedrock
UST=underground storage tank

\\Gst-srv-01\hglgis\Chem-Fab_MSIW\FFS\ (1-16)Jan-Feb_HexChrom_Unconf_Shallow_Bedrock.mxd
9/1/2016 TB
Source: HGL, URS, EA, AECOM
NAIP Aerial Imagery



Figure 11
Remedial Design
Example Layout



Legend

- USB Monitoring Well
- Proposed Recovery (75 ft-bgs)
- Proposed Recovery (50 ft-bgs)
- MW-01
9.3 Well Identification
TCE Concentration (µg/L)
- Drainage Ditch
- Creek
- 100 TCE Concentration Contour
(Dashed where inferred)
- Area of Highest
Groundwater Concentration (AOHC)
- Former 10,000-Gallon UST
- Former AST Farm
- Self-Storage Facility
- Former Chem-Fab Facility
- Potential Water Treatment
Building Location
- Proposed Access Road
to Treatment Building

Notes:
 *=data from April 2010
 µg/L=microgram per liter
 AST=aboveground storage tank
 TCE=trichloroethene
 U=The analyte was analyzed for, but was not detected at a level
 greater than or equal to the level of the adjusted Contract
 Required Quantitation Limit (CRQL) for sample and method.
 USB=unconfined shallow bedrock
 UST=underground storage tank

\\gst-srv-01\HGLGIS\Chem-Fab_MSIW\FFS\
 (4-01)RD_Ex_Layout.mxd
 9/1/2016 TB
 Source: HGL, URS, EA, AECOM
 NAIP Aerial Imagery

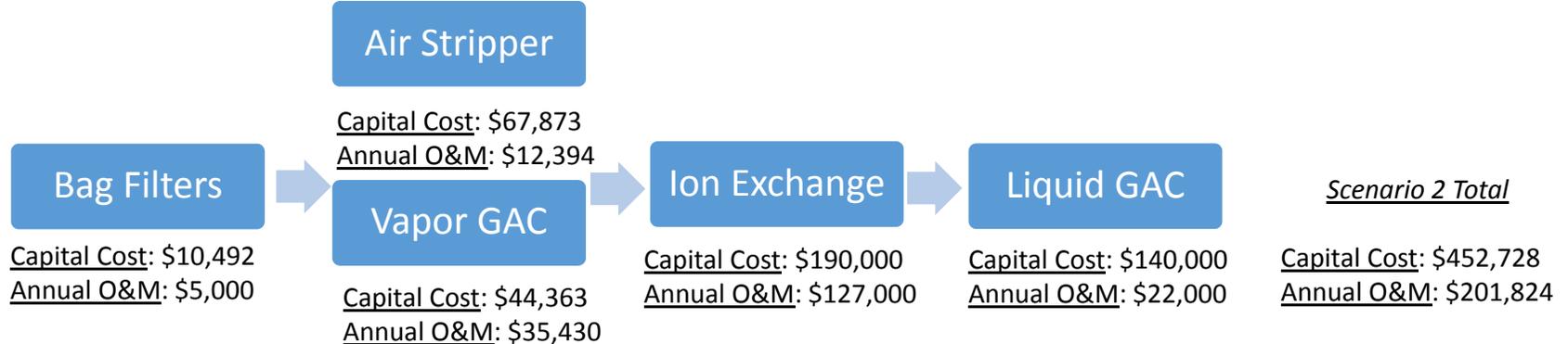


Figure 12 – Alternative 2 Treatment Train Scenarios

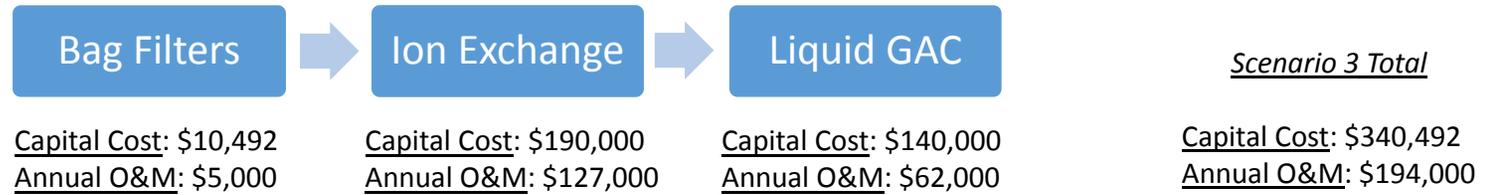
Scenario 1
All Site-COCs above discharge criteria. COCs that need treatment: VOCs, 1,4-dioxane, Cr(VI), and PFCs.



Scenario 2
1,4-dioxane below discharge criteria. COCs that need treatment: VOCs, Cr(VI), and PFCs.



Scenario 3
1,4-dioxane below discharge criteria and liquid GAC can effectively treat both VOC and PFCs. COCs that need treatment: Cr(VI), VOCs, and PFCs.



Note: The total capital costs presented in this figure do not include capital expenditures associated with the construction, operation, and maintenance of the treatment building. The annual O&M costs are non-labor costs and include only energy and materials costs associated with each individual treatment component.