Superfund Program
Proposed Plan

U.S. Environmental Protection Agency, Region 2

Fair Lawn Well Field Superfund Site

Borough of Fair Lawn, New Jersey

August 2018

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives that the United States Environmental Protection Agency (EPA) considered to remediate contaminated groundwater at the Fair Lawn Well Field Superfund Site (Site) in the Borough of Fair Lawn (Borough), Bergen County, New Jersey, and identifies EPA's preferred alternative along with the reasons for this preference. The Site was placed on the Superfund National Priorities List (NPL) in September 1983.

EPA is addressing the cleanup of the Site in one phase, called an operable unit, which addresses contaminated groundwater and surface water found at the Site. This remedy is the final remedial action for the Site.

The proposed remedy includes relying on state-lead source control remedies at Fisher and 18-01 Pollitt Drive, as well as the Westmoreland Well Field (WMWF) to continue removing and treating groundwater contaminated with volatile organic compounds (VOCs). In addition, the WMWF water supply system will be enhanced to treat for 1,4-dioxane and perfluoro octane acid and perfluoro octanoic sulfonate (PFOA/PFOS). The remedy would also include installing an additional recovery well(s) with treatment unit(s) to provide further hydraulic control and contaminant removal of impacted groundwater.

Any decision regarding the final design of the WMWF upgrade will be made in coordination with the Borough, the New Jersey Department of Environmental Protection (NJDEP) and EPA. The Borough would evaluate whether the treated water from the WMWF will be used as a water supply source, but it is assumed that this would be the case.

This Proposed Plan was developed by the EPA, the lead agency for the Site, in consultation with the NJDEP, the support agency. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). EPA, in consultation with NJDEP, will select a final remedy for contaminated groundwater at the Site after reviewing and considering all information submitted during the 30-day public comment period.

EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the

MARK YOUR CALENDARS

Public Comment Period
August 6 – September 5, 2018
EPA will accept written comments on the Proposed Plan during the public comment period.

Public Meeting
August 23, 2018 at 7:00 P.M.
EPA will hold a public meeting to explain the Proposed Plan and the other alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at

Fair Lawn Borough Hall
Council Chambers/Court Room
8-01 Fair Lawn Avenue
Fair Lawn, NJ 07410

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

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

Maurice M. Pine Free Public Library
10-01 Fair Lawn Avenue
Fair Lawn, New Jersey 07410
(201) 796-3400
Please refer to website for hours:
http://www.fairlawnlibrary.org/

EPA's website for the Fair Lawn Well Field Site:
https://www.epa.gov/superfund/fair-lawn-wellfield

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alternatives presented in this Proposed Plan. This Proposed Plan summarizes information that can be found in greater detail in the final Remedial Investigation (RI) Report and final Feasibility Study (FS) Report and other documents contained in the administrative record file for this Site.

SITE DESCRIPTION

The Site includes the groundwater that impacts four municipal wells located on or around Westmoreland Avenue. These wells are part of the WMWF. Two of the four wells are used to provide treated drinking water to the residents of the Borough.

The Site encompasses the groundwater underlying the source area properties located within the Fair Lawn Industrial Park to the northeast and the WMWF to the southwest, as well as the surface water impacted by the groundwater contamination. Henderson Brook flows west along the southern property line of several source area facilities and southwest on the south side of Route 208 near the WMWF until it reaches the Passaic River. See Figure 1. The contaminated plumes include the overburden/water table, intermediate bedrock and deep bedrock aquifers. See Figures 3 and 4.

A summary of the source area properties located in the Fair Lawn Industrial Park where remediation is being conducted under NJDEP oversight consists of the following:

<u>Fisher Scientific</u>

The Fisher Scientific Company, LLC (Fisher) facility is situated on 9 acres of land in the northeastern corner of the industrial park. It consists of 10 buildings, six of which are enclosed spaces and the remaining 4 buildings are open structures that are used for various production, packaging, and administrative purposes. Fisher began manufacturing operations in 1955. Since 1955, the Fisher facility operations consists of formulating, distilling, repackaging, and distributing various laboratory reagents and solvents. In 2006, Fisher's parent company, Fisher Scientific International Inc. merged with Thermo-Electron Corporation to become Thermo-Fisher Scientific Inc. (Thermo-Fisher).

<u>Sandvik</u>

The Sandvik, Inc. (Sandvik) facility is situated on 10.3 acres, adjacent to the Fisher facility in the northern portion of the industrial park. Sandvik began operations in 1955. Between 1955 and 1970, Sandvik manufactured cutting tools, springs, and other components from strip steel. From 1970 through May 2006, Sandvik manufactured cemented carbide cutting tools. In May 2006, Sandvik ceased manufacturing operations. From 2013 to 2014, Sandvik modified the building, removing the northwestern portion of the building and adding a second story along the southern portion of the building. The facility is currently used as office space and a training center.

<u>Former Eastman Kodak</u>

The former Eastman Kodak (Kodak) facility is situated on 9.95 acres in the southeastern corner of the industrial park. The property was first developed in 1954. Kodak operated a photofinishing lab at the facility from 1961 until 1988. From 1988 to 1994, the photofinishing activities were operated by Qualex Inc. (Qualex), a joint venture between Kodak and U.B. Fuqua Inc. (Fuqua). In 1994, Kodak bought out the interest in Fuqua and continued photofinishing operations as Qualex until 2004. The facility was decommissioned in 2004 and demolished in 2006. On March 9, 2007, Kodak sold this property to Fair Lawn Promenade (FLP), LLC, Inc., which completed mixed-use redevelopment of the property in 2014. The property currently consists of three office/retail space single story buildings and two 3-story residential apartment complexes with ground floor parking.

<u>18-01 Pollitt Drive</u>

The 18-01 Pollitt Drive facility is situated on 9.41 acres in the center of the industrial park. The current single one-story building with several tenants was constructed as an addition to the original structure. The property was first developed in 1957 by the Einson Freeman Company, which operated a lithographic printing business from 1958 to the late 1970s. Between 1979 and 1988, the property was used for lithographic printing operations by Unified Data Products (UDP). In 1988, the property was purchased by Polevoy Associates. Between 1988 and 2006, the property was used primarily for office and warehouse space. 18-01 Pollitt Drive LLC (wholly owned by Hampshire Companies) purchased the property on May 11, 2006 and sold it to DSL Pollitt, LLC (DSL Pollitt) in 2017. The property currently houses BCI Communications, Valley Hospital Medical Facility, and Retro Fitness.

SITE HISTORY

The WMWF was established by the Borough in 1948, beginning with the installation of municipal well FL-10, and is situated in a residential neighborhood adjacent to the Fair Lawn Industrial Park. Between 1948 and 1950, municipal wells FL-11, FL-12, and FL-14 were installed. FL-11 and FL-14 were brought on-line, and FL-12, which produced little water, was used as an observation well. The WMWF wells are illustrated on Figure 2. From 1952 to 1969, the Borough installed non-potable industrial wells FL-23, located across Pollitt Drive to the east of the former Kodak property, and FL-24, located along the northeastern boundary of the former Kodak property.

In 1978, VOCs including tetrachloroethylene (PCE), and trichloroethylene (TCE) were detected in these municipal wells. Subsequently, FL-23 and FL-24 were taken off line. To determine the origin of the contamination, the NJDEP investigated all industrial and commercial facilities within a 3,000-foot radius of the contaminated municipal wells. The investigation concluded that the primary source of the contamination originated from the Fair Lawn Industrial Park. Based on the investigation findings, two local companies, Fisher and Sandvik, were identified as contributing sources to the groundwater contamination.

EPA sent notice letters to Fisher and Sandvik in February 1984, advising them of their potential liability at the Site. In March 1984, both Fisher and Sandvik signed Administrative Consent Orders (ACOs) with the NJDEP to conduct on-site investigations of soil and groundwater, remove and dispose of contaminated soils, perform long-term monitoring of on-site groundwater quality, and pay the Borough for the installation, and operation and maintenance of air stripper treatment at the WMWF. In 1986, the Borough installed the air stripper system to treat the contaminated wells located at the WMWF.

EPA became the lead agency for the Site groundwater cleanup in September 1992, and initiated a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of groundwater contamination. NJDEP will continued to be the lead at the source area properties while the EPA remedy will address the contaminated groundwater captured by the Westmoreland well field, as well as surface water impacted by groundwater.

In May and June 1995, EPA and the Fair Lawn Health and Water Departments conducted a residential well sampling and analysis program to determine the usage and quality of residential well water. The results of this program found these wells were being used for both irrigation and drinking water purposes, and the data results indicated they met the established drinking water standards.

In April 1999, EPA entered into an interagency agreement with the United States Geological Survey (USGS) to conduct an area-wide groundwater study of the Fair Lawn area. This groundwater study developed a flow model used to define areas of influence or capture zones from all existing pumping wells to determine sources of contamination found at the WMWF, to determine if Henderson Brook is a groundwater discharge area and to recommend any further actions. A groundwater study report submitted by the USGS in May 2005 presented and discussed those areas where contaminated groundwater contributes to the WMWF.

In March 2006, EPA issued notice letters to Fisher, Sandvik and Kodak under CERCLA, advising them to perform an RI/FS, and reimburse EPA for past costs incurred with respect to the Site. On March 28, 2008, Fisher, Sandvik and Kodak, collectively known as the potentially responsible parties (PRPs), entered into a Settlement Agreement and Administrative Order on Consent (Settlement Agreement) with EPA to conduct the RI/FS.

The PRPs submitted a draft RI/FS workplan which was approved by EPA in January 2009. The workplan was made available to the public at information sessions conducted by the EPA on March 16 and 17, 2009.

In September 2009, the PRPs began installing five new monitoring wells, which were completed in December 2009. Two groundwater and surface water sampling events were conducted in March 2010 and June 2011. A public meeting conducted by EPA was held in Fair Lawn in October 2012 to update the community on the progress of the RI/FS activities. The information is summarized in an approved Final Site Characterization Summary Report (SCR) submitted in February 2015 and which is in the administrative record file.

Kodak filed for bankruptcy in January 2012, and subsequently notified EPA that it would no longer perform the RI/FS under the Settlement Agreement. Fisher and Sandvik continued to perform the RI/FS.

At the request of EPA, the PRPs submitted a draft RI/FS work plan addendum in September 2013. The approved December 2013 RI/FS work plan addendum included the installation of five overburden and seven bedrock monitoring wells, and two rounds of comprehensive groundwater and surface monitoring. From May to July 2014, prior to installing the monitoring wells, twelve temporary overburden monitoring wells were installed and sampled to delineate shallow groundwater at the Site. Monitoring wells were installed between July and September 2014, and two comprehensive groundwater sampling events were performed in November 2015 and June 2016.

NJDEP-Lead Response Activities

The PRPs within the Fair Lawn Industrial Park are required under NJDEP authority to clean-up their source area VOC contamination in soils and groundwater. Though not part of the CERCLA remedy, a summary of the details is provided below to help provide a context for how the CERCLA remedy will complement the state's efforts. However, additional historic information regarding these properties can be found in the June 2018 Final RI Report.

Thermo-Fisher

Fisher conducted six soil areas of concern (AOCs) investigations under NJDEP direction between 1984 and 1993. A total of approximately 6,000 cubic yards of soils contaminated with VOCs (PCE, TCE, chloroform 1,2-dichloroethane, and 1,1,1-trichloroethane) were removed during excavation activities performed from 1986 to 1989. Fisher proposed and NJDEP approved No Further Action (NFA) for each soil area of concern in August 1993.

In February 1986, Fisher proposed a groundwater recovery and treatment system (GRTS) to capture the contaminated groundwater plume at its facility. The bedrock GRTS began operating in 1989. Three bedrock production wells extract groundwater which is treated by carbon adsorption, and discharged to Henderson Brook under a New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) permit. Approximately 1.2 billion gallons of bedrock contaminated groundwater has been recovered and treated since 1989.

The overburden GRTS began operating in 1994. Two recovery trenches were enhanced in 1996 with seven extraction wells. Extracted groundwater is treated via air stripping with carbon adsorption, and discharged to the Passaic Valley Sewerage Commission (PVSC) under a POTW permit. Approximately 122 million gallons of overburden groundwater have been recovered and treated since 1994.

A network of 44 wells and 14 piezometers monitor the groundwater quality in the overburden and bedrock aquifers. A Classification Exception Area (CEA) restricting the installation of potable wells in and around the overburden and bedrock contamination plumes was approved by NJDEP in 2002.

Surface water sampling conducted along Henderson Brook under NJDEP began in November 2005. Results indicated that benzene, carbon tetrachloride (CT), PCE, TCE, and vinyl chloride concentrations were present in Henderson Brook above the applicable NJDEP surface water criteria. Subsequent sampling indicated that concentrations decreased to levels below the NJDEP surface water criteria. In addition, one round of sediment and pore water sampling along Henderson Brook was conducted in 2006. No compounds were detected above NJDEP's freshwater sediment screening criteria, but TCE and CT were observed above the applicable NJDEP surface water criteria in sediment pore water samples.

To further characterize soil impacts on their property and meet NJDEP RI requirements, Fisher conducted additional soils investigation activities between December 2013 and April 2016. The results of the NJDEP RI activities identified three focused source areas for remediation, within previous AOCs. Fisher is evaluating remedial alternatives to address the on-site impacted soils.

A comprehensive groundwater sampling event was conducted in May 2014 using passive sampling techniques. During this event, the presence of Dense Non-Aqueous Phase Liquid (DNAPL) was discovered. Fisher has been conducting routine sampling and recovery events to remove the DNAPL. No DNAPL has been observed since June 2014. Gauge/recovery events are currently conducted on a quarterly basis.

Three additional on-site monitoring wells, and two temporary off-site well points were installed in 2015 to complete overburden groundwater delineation and VI pathway assessment.

The overburden and bedrock GRTS will continue to operate and groundwater, surface water and DNAPL will be sampled in accordance with the NJDEP ACO. In addition, remedial alternatives are being evaluated to address the impacted soils, and a vapor VI investigation is being conducting at on-site buildings in accordance with the updated January 2018 NJDEP VI guidance.

Sandvik

From 1983 to 1984, Sandvik conducted investigations and remediation at three soil AOCs on its property under an NJDEP ACO. Sandvik removed and disposed of approximately 1,100 cubic yards of soil, 200 buried containers, and a 4,000-gallon waste oil tank. In September 1984, Sandvik completed installation on a network of overburden, and shallow and intermediate bedrock groundwater monitoring wells, and initiated routine groundwater monitoring events.

Between 1985 and 1996, Sandvik conducted monthly water level monitoring and quarterly groundwater sampling at 11 wells and the Basement Sump. The monitoring/sampling frequency was decreased to quarterly/semi-annual in 1996 and has continued with this schedule through the present time. In 2003, Sandvik began semi-annual sampling of surface water in Henderson Brook.

In May 2006, Sandvik ceased manufacturing operations which triggered compliance obligations under the NJDEP Industrial Site Recovery Act (ISRA). In accordance with ISRA, a Preliminary Assessment (PA) was conducted from June to August 2006. The PA was supplemented by a Site Investigation (SI) performed between October and November 2006. Nine AOCs were identified during the PA. Remedial investigation activities were conducted in 2007 and 2008, with all but one of the nine AOCs closed out (groundwater). NFAs were recommended in May 2010 and August 2010, and approved by NJDEP in letters dated July 5, 2011 and August 29, 2011.

In February 2012, as part of a pre-design investigation being conducted at the property, additional soil boring samples were collected at Pit #1 and the Waste Oil Tank Areas. The results confirmed the NFA designation because the contaminants found at the facility were below NJDEP soil remediation standards.

A basement sump operated since 1966 to dewater around the foundation of the former office building located on the western side of the property until it was shut down on March 20, 2014, and later demolished along with the former office building as part of Site redevelopment activities.

In May 2012, Sandvik initiated activities associated with the design and implementation of a groundwater remediation system. NJDEP issued a NJPDES Discharge to Groundwater (DGW) Permit-by-Rule (PBR) to Sandvik for pilot testing an enhanced in-situ bioremediation (EISB) using emulsified vegetable oil (EVO), bioaugmentation cultures, and a reductant to address the former waste oil underground storage tank (UST), and exterior drum storage pad source areas for TCE, 1,1,1-TCA, and associated daughter products. Final design parameters were developed and injection methods were selected to accommodate Site redevelopment requirements.

In February 2014, NJDEP issued a NJPDES DGW PBR to implement the full scale EISB injection system. The EISB system was initiated in September 2014 and is planned to run for a 10-year period beginning with three to five years of active remediation via EISB, followed by five years of monitored natural attenuation (MNA). Details regarding the groundwater on this property are documented in the June 2018 Final RI.

Former Kodak Property

In 1990, Kodak conducted remedial activities at its facility under the NJDEP UST program which included the removal of two fuel oil USTs, two gasoline USTs and their appurtenant structures, closure of a dry well, removal of floor drains from the center section of the basement, and installation of a monitor well in the shallow bedrock aquifer. Subsequently, Kodak entered into a Memorandum of Agreement (MOA) with the NJDEP in 1992 which outlined the investigation activities to be conducted on the property.

Between 1990 and 2007, eight AOCs were identified, along with soil removal activities conducted during the investigation phase. A total of 3,160 tons of impacted soils and material (piping, sludge, concrete and brick) associated with the building demolition, and 2,540 feet of subsurface piping associated with five sumps and five catch basins. Details are provided in the Final RI report dated June 2018.

Kodak submitted a Comprehensive Investigation and Remedial Action Report to NJDEP in January 2008, to which the NJDEP issued NFA determinations for several AOCs on November 20, 2008. Additional remedial investigation and remedial actions were performed on the remaining AOCs, and Kodak submitted a Remedial Action Report for AOC 4.1 and 7.2 in March 2012, indicating NFA was appropriate for the remaining AOCs with the implementation of engineering and institutional controls.

Kodak conducted 30 bedrock groundwater monitoring and sampling events under the NJDEP MOA from 1990 to 2011. Kodak determined that the primary source areas impacting groundwater were from AOC-1 and AOC-3 which have been remediated, resulting in reduced levels of compounds observed in groundwater on the property. Historically, groundwater contaminants on this property include PCE, TCE, 1,1,1-TCA, 1,1-DCA, 1,1-DCE, benzene, bromodichloromethane, vinyl chloride, total chromium, and silver. Monitoring wells were abandoned in late 2011 due to redevelopment plans on the property. However, NAPL residues consisting of highly weathered, highly viscous No. 6 fuel oil from AOC-1 remain in some bedrock fractures. This NAPL is not recoverable and has not dissolved in the groundwater. Details regarding the groundwater on this property are documented in the June 2018 Final RI.

<u>18-01 Pollitt Drive Property</u>

A Phase I Environmental Investigation was performed coinciding with the former property owner (Hampshire) refinancing activities. This investigation and subsequent environmental activities identified elevated levels of VOCs on the property. After reporting the discovery of a discharge to NJDEP in February 2008, Hampshire agreed to an MOA with NJDEP to conduct remedial investigations.

Subsequently, seven AOCs were identified, with five of the AOCs located in the northwestern side of the property where historic lithographic printing operations had been conducted by UDP, which owned the property in the 1980's.

Hampshire initiated investigation activities to identify potential VOC contaminants on the property in January 2008. Soil results confirmed VOC contamination on the property associated with AOC-1 through AOC-4. AOCs 5 thru 7 did not have any VOCs in soils above the applicable NJDEP soil remediation standards.

Between October 2008 and January 2009, Hampshire excavated and disposed of approximately 11,000 tons of PCE-impacted soils to a depth of 20 feet beneath the on-site building to address soils related to AOCs 1, 2, and 4.

Between May and July 2011, Hampshire excavated approximately 4,301 tons of PCE impacted soil at AOC-3, located outside the building, to a depth of 24 feet ground surface (bgs).

In 2014, an enhanced in-situ bioremediation program was initiated by Hampshire to address the remaining PCE and daughter products impacting the soils and groundwater on the property. The details of this program are documented in the March 2014 Discharge to Groundwater Permit-By-Rule (DGW PBR) Application and summarized in the May 2018 FS report.

A groundwater remediation system was installed and operated by Hampshire to provide hydraulic capture of groundwater emanating from the property and prevent migration to Henderson Brook. The system consists of one overburden and one bedrock recovery well. In accordance with the final NJPDES BGR Discharge Permit, the system is designed with an air stripper to remove CT, PCE, TCE, chloroform, 1,1-DCE, and cis-1,2-DCE with monitoring of 1,4-dioxane. The treated water discharges to Henderson Brook. Air from the stripper is treated through granular activated carbon (GAC) units under a permit issued by the NJDEP Division of Air Quality–Air Quality Permitting Program. The system has been operating since in February 2017.

A CEA was established to address the horizontal and vertical extent of Hampshire's groundwater plume area, and has an indeterminate time frame. This CEA overlaps with the CEA established by Fisher.

SITE CHARACTERISTICS

Physical Settings

The Site lies within the Piedmont Physiographic Province which is characterized by low rolling hills which are the erosional remnants of several ancient mountain ranges. In northern New Jersey, Precambrian metamorphic rocks make up the basement of this Province. Above the basement rocks are sedimentary and igneous rocks of the Newark Basin ranging in age from Triassic to Jurassic. Surficial geology is dominated by Pleistocene glacial deposits with Holocene sediments along the river/stream channels.

The Site is located approximately 80-100 feet above mean sea level, with surface elevations in the area decreasing to the southwest, towards the Passaic River. The localized topography slopes towards Henderson Brook and the Former North Branch of Henderson Brook. Storm water runoff follows these topographic gradients, traveling over paved surfaces and collecting in storm sewer inlets along the nearby streets and parking areas, and discharging to Henderson Brook.

Site Geology

Unconsolidated surface materials consist of glacial and post-glacial deposits. The post-glacial sediments consist primarily of modern channel and floodplain deposits. The post-glacial modern channel and floodplain alluvium deposits consist of silt to gravel with minor amounts of clay. The water table on-site is primarily in unconsolidated glacial and nonglacial sedimentary deposits, and transitions from overburden into shallow bedrock on the former Kodak property.

Overburden is typically heterogeneous containing lenses or layers of soil whose geological properties contrast with those of their surroundings. Overburden is typically thinnest (about 10 feet) near topographic highs, where glaciofluvial or glaciolacustrine sediments are typically absent, and thickest (about 80 feet) in the area between Henderson Brook and Diamond Brook where bedrock elevations are at their lowest on-site.

The Site is underlain by the Passaic Formation which consists of layers of conglomerate, sandstone, and siltstone. The Passaic Formation is a primary source of groundwater for municipal, industrial and other uses at the Site and surrounding areas. Bedrock bedding planes strike generally north 6° east and dip approximately 7° to the northwest. Fractures and bedding plane partings (approximately 350 feet below ground surface or greater) are often filled with minerals such as gypsum.

Hydrogeology

Groundwater flows in the Passaic Formation through secondary porosity (fractures, joints, bedding plane partings, etc.) rather than primary porosity (rock matrix). Groundwater well pumping rates of up to several hundred gallons per minute have been achieved and sustained in the Passaic Formation. Wells aligned along bedding strike in the Passaic Formation would be hydraulically connected. The water-bearing units are separated from each other by thicker stratigraphic layers with fewer bedding partings or fracture seams. The USGS determined that the water-bearing units have a mean thickness of 50 feet, and the confining units a mean thickness of 83 feet at the Site. The relatively thicker intervening confining units are, however, cross-cut by near-vertical extension fractures, making them leaky and providing a pathway for groundwater to percolate through the confining layers and therefore between transmissive units. Horizontal groundwater flow in bedrock is anisotropic. Anisotropic conditions in bedrock, as seen in the shut-down testing data, showed that the hydraulic radius of influence of each test extended out more parallel to bedrock strike and less parallel to bedrock dip.

Bedrock is divided into upper and lower hydro-stratigraphic zones which are separated by a leaky confining unit. Groundwater flow within the bedrock zones is under semi-confined to confined conditions as interpreted from the hydraulic response observed at monitoring points during shut-down testing.

Groundwater recharge occurs generally along the eastern side of the Site.

Under non-pumping conditions in the upper bedrock zone the Passaic River is a regionally significant discharge point for groundwater. Local groundwater flow discharges to Diamond and Henderson Brooks.

Under pumping conditions, groundwater in the upper bedrock zone flows toward the production wells at WMWF and Fisher. The pumping in the upper bedrock zone at the WMWF causes groundwater beneath the industrial park to move west/southwest along water bearing units while expanding vertically throughout the upper bedrock zone. The WMWF could capture most, if not all, of the groundwater that flows west and southwest of the industrial park that is not already captured by the Fisher groundwater recovery systems.

In addition, the distribution of PCE, TCE and CT indicates the COCs migrate to the west/southwest in the overburden and bedrock because of pumping at Fisher and the WMWF. Horizontal migration patterns of contaminants are controlled by bedding plane partings and fracturing in water bearing zones, aligned with strike and dip of the bedrock formation underlying the Site. Vertical migration in the bedrock occurs through vertical fracture spanning the less fractured confining units present underneath the Site. See Figures 5 thru 7 illustrate the orientation of the PCE overburden and bedrock plumes migrating from the industrial park to the WMWF.

Surface Water

Surface water (i.e., Henderson Brook) flows from the north/northeast to the south/southwest through the Site, draining into the Passaic River. Current flow conditions show external inputs (i.e., discharges from 18-01 Pollitt Drive's and Fisher NJPDES permits) make up the primary flow source, and account for approximately 55% of flow in Henderson Brook.

Site contaminants in the overburden near 18-01 Pollitt Drive and Fisher are present in Henderson Brook but decrease to below the SWSL before the brook exits the industrial park, except for PCE and CT. PCE entering Henderson Brook from the overburden groundwater originating at 18-01 Pollitt Drive continues to be present in the south portion of the brook. CT entering Henderson Brook from the overburden groundwater originating at Fisher decreases in concentration in the southern portion of the brook.

Groundwater Elevations

The water table elevations at the Site decrease from northeast to southwest, following trends in topography. Based on this information, the water table aquifer flows towards Henderson Brook, and to a lesser extent, to the Former North Branch of Henderson Brook. The removal of the Sandvik Sump prior to the 2015 and 2016 gauging events has eliminated the groundwater depression observed at the Sandvik facility during the June 2010 and March 2011 events.

RESULTS OF THE REMEDIAL INVESTIGATION

Nature and Extent of Contamination

As documented in the February 2015 SCR and the April 2018 RI, PCE, TCE, CT, and 1-4-dioxane were the compounds most widely distributed and persistently detected in the overburden and bedrock aquifers at the Site. Other site-related compounds detected in the groundwater include: benzene: 1,1-dichloroethylene (1,1-DCE); cis-1,2-dichloroethylene (cis-1,2-DCE); vinyl chloride (VC); chloroform; 1,1,1-trichloroethane (1,1,1-TCA); 1,1-dichloroethane (1,1-DCA); 1,2-dichloroethane (1,2-DCA); chlorobenzene; total xylenes; ethylbenzene; toluene; 1,2-dichlorobenzene (1,2-DCB); n-heptane; and, methyl tertiary butyl ether (MTBE).

These site-related compounds migrate from various source areas at the facilities in the north/northeast side of the Site to the west/southwest in the direction of the WMWF.

Horizontal migration patterns of contaminants are primarily controlled by bedding plane partings and fracturing in water-bearing zones, aligned with strike and dip of the bedrock formation underlying the Site.

Vertical migration in the bedrock occurs through vertical fracture spanning the less fractured confining units present underneath the Site.

GROUNDWATER SAMPLING RESULTS

Overburden Zone

Groundwater samples collected from the overburden zone found PCE and TCE in the following areas;

- on the northwest side of the Site at concentrations up to 1,650 micrograms per liter (μg/L) PCE and 85,700 μg /L TCE in 2015, and 3,210 μg/L PCE and 92,600 μg/L TCE in 2016;

- in the center of the Site at concentrations up to 1,560 μg/L PCE and 29.8 μg/L TCE in 2015, and 1,810 μg/L PCE and 67.2 μg/L TCE 2016; and

- on the southwest side of the Site at concentrations up to 237 μg/L PCE and 10.9 μg/L TCE in 2015, and 74.7 μg/L PCE and 3.9 μg/L TCE in 2016.

CT was only detected on the northwest side of the Site, at concentrations up to 197,000 μg /L in 2015 and 190,000 μg /L in 2016. Also, 1,4-dioxane was detected at all three locations in the overburden; on the northeast side of the Site at concentrations up to 131 µg/L (2015) and 271 µg/L (2016), in the center of the Site at concentrations 19.1 µg/L (2015) and 4.94 µg/L (2016), and the southeast side of the Site at concentrations up to 13.4 µg/L (2015) and 4.24 µg/L (2016).

A table summarizing the highest concentrations of contaminants found in the overburden is provided below.

	Northeast Side of Site (µg/L*)		Center of Site (µg /L)		Southeast Side of Site (µg /L)	
	2015	2016	2015	2016	2015	2016
PCE	1,650	3,210	1,560	1,810	237	74.7
TCE	85,700	92,600	29.8	67.2	10.9	3.9
CT	197,000	190,000	ND	ND	ND	ND
1,4-dioxane	131	271	19.1	4.94	13.4	4.24

*µg/L = microgram per liter

The contamination in the overburden zone covers approximately 107 acres from the north/northeast to the south/southwest of the Site.

Intermediate Bedrock

Groundwater samples collected in intermediate bedrock detected PCE in the center of the Site at concentrations up to 9,780 µg/L (2015) and 6,530 µg/L (2016), TCE on the northeast side of the Site at concentration up to 223 µg/L (2015) and 177 µg/L (2016) and center of the Site at concentration up to 134 µg/L (2015) and 206 µg/L (2016). CT was only detected in the northeast side of the Site at concentrations up to 421 µg/L (2015) and 112 µg/L (2016). 1,4-dioxane is distributed across the Site at elevated concentrations ranging from 44.8 to 147 µg/L (2015) and 12.4 to 53.1 µg/L in (2016).

The contamination in the intermediate bedrock covers approximately 187 acres from the north/northeast to the south/southwest.

Deep Bedrock

Groundwater samples collected in the deep bedrock detected PCE and TCE in the center of the Site at concentrations up to 157 µg/L PCE and 131 µg/L TCE (2015) and 130 µg/L PCE and 144 µg/L TCE (2016).

CT had only a few detections, 15 µg/L (2015), and 1.5 µg/L and 17.6 µg/L (2016). 1,4-dioxane in the center of the Site ranged from 6.5 to 30.5 µg/L (2015), and 1.25 to 11.1 µg/L (2016).

The contamination in the deep bedrock zone extends approximately 177 acres from the north/northeast to the south/southwest.

Westmoreland Well Field

Samples collected from groundwater entering the public supply wells, which are open to the entire geological framework, contained PCE concentrations ranging from 2.4 to 324 µg/L (2015) and 2.2 to 220 µg /L (2016); TCE concentrations ranging from 2.2 to 14.9 µg/L (2015) and 1.9 to 18.2 µg/L (2016); CT concentrations ranged from ND to 1.6 µg/L (2015) and ND to 1.5 µg/L (2016); and 1,4-dioxane concentrations ranged from ND to 7.4 µg/L (2015) and ND to 8.59 µg/L (2016).

In 2013, PFOA was detected in the WMWF at concentrations ranging from 30 – 36 (ng/L) nanograms per liter. PFOS was detected at concentrations ranging from 58 - 66 ng/L as well. Based on the Site hydrogeology, these compounds could have originated from the contributing source properties located in the Fair Lawn Industrial Park. An investigation to be conducted during the remedial design will determine the nature and extent of these compounds.

Surface Water

Surface water samples collected in November 2015 and June 2016 from Henderson Brook detected the following chemicals of concern (COCs): PCE; benzene; CT; and, VC (exceeding their surface water screening levels (SWSLs). PCE was detected most frequently in the lower half of the Henderson Brook ranging from 0.7 to 13.4 µg /L (2015) and 0.76 to 9.4 µg /L (2016). CT was detected in the upper half of Henderson Brook, near the source areas, at concentrations ranging from 0.37 to 0.6 µg /L (2015) and 0.34 to 3.6 µg /L (2016). Benzene and VC had a few sporadic detections above their SWSL in the upper half of Henderson Brook.

Additional data collected during the June 2010 and March 2011 surface water sampling events are presented in the 2015 SCR.

Principal Threat Wastes

Principal threat wastes are considered source materials, i.e., materials that 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; however, non-aqueous phase liquid (NAPL) in groundwater may be viewed as potential source material. Analytical results from the remedial investigation did not reveal concentrations of contaminants in groundwater indicative of the presence of NAPL. However, NAPL was identified during investigations conducted by PRPs on their properties and is being addressed under NJDEP-led actions. As described above, soil contamination that may be considered principal threat waste has been or is being addressed through several NJDEP actions.

Vapor Intrusion

VOC vapors released from contaminated groundwater and/or soil have the potential to move through the soil and seep through cracks in basements, foundations, sewer lines, and other openings. In accordance with the January 2009 RI/FS work plan, the PRPs conducted VI investigations at the Site. In March and April 2009, the PRPs collected two rounds of vapor samples. The first round of sampling in March 2009 included sub-slab samples collected underneath the concrete slabs at ten residential properties and four commercial buildings near Route 208. Based on the first round of results, in April 2009, EPA collected a second round of sub-slab and indoor air samples at the residential properties and commercial buildings sampled in March 2009.

In August 2013, EPA collected sub slab vapor samples from the Westmoreland Elementary school. Later that year, between September and December 2013, EPA collected sub slab samples from twelve additional residential properties. Since that time, at the request of EPA, the PRPs sampled several additional residential properties; two residential properties between March and April 2014, and one residential property between November and December 2015.

In addition to the sampling performed under EPA direction, the PRPs and other parties performed additional VI investigations at nine commercial and three residential properties with several of the commercial buildings requiring the installation of vapor mitigation systems under NJDEP-led authority.

Overall, the sample results from the EPA-led investigation found that all the residential properties are currently not at risk for contaminated vapors entering their space, and no additional VI sampling is scheduled. However, if the Site conditions change, EPA would evaluate and determine if additional VI sampling is necessary. The results of VI sampling are documented in the November 2017 VI Investigation Report, which is in the administrative record file.

SCOPE AND ROLE OF THE ACTION

EPA is addressing the cleanup of the Site in one phase, called an operable unit, which addresses contaminants in groundwater and surface water that originated from contributing source areas within the industrial park found at the Site. These source area properties will be addressed under NJDEP-led authority and are not part of the NPL site. EPA will address the contaminated groundwater migrating from the source area properties and impacting the water supply system.

This remedy is the final remedial action planned for the Site. The primary objectives of this action are to remediate the groundwater contamination, minimize the migration of the contaminants in groundwater (within the aquifer and into surface water), and minimize any potential future health impacts from exposure to groundwater contaminants at the Site. This action will restore the aquifer to its most beneficial use as source of drinking water.

SUMMARY OF SITE RISKS

Human Health Risk Assessment:

As part of the RI/FS, a baseline human health risk assessment (BHHRA) was conducted to estimate current and future effects of contaminants on human health. A BHHRA is an analysis of the potential adverse human health effects caused by hazardous substance exposure in the absence of any actions to control or mitigate these exposures under current and future Site uses.

A four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process consists of: hazard identification of chemicals of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization (see box entitled “What is Risk and How is it Calculated” for more details on the risk assessment process).

COPCs were selected by comparing the maximum detected concentration of each analyte in surface water and groundwater with available risk-based screening values for potentially complete pathways. The primary chemicals identified as COPCs and requiring further evaluation in the BHHRA are VOCs. PCE, TCE, CT, and 1-4-dioxane were the compounds most widely distributed and persistently detected in the overburden and bedrock aquifers. Additionally, other chemicals such as semi-volatile organic compounds (SVOCs), metals, and pesticides were also retained for additional evaluation.

The exposure assessment identified potential human receptors based on a review of current and reasonably foreseeable future land use at the Site. The land use in Fair Lawn is a mixture of residential, industrial, and commercial areas. The industrial/commercial area is represented mainly by the Fair Lawn Industrial Park located to the northeast of Route 208. Within the park, there are office-oriented operations, manufacturing and distribution, research and development, and a mixed-use commercial/residential community. The residential areas are situated to the southwest of Route 208 and the area consists of private properties, school athletic fields, and recreational open space. EPA anticipates that the future land use would not change from its present scenario. Potentially exposed populations in current and future risk scenarios include residents (young child and adult), construction workers, utility workers, Site workers and transient visitors (preadolescent and adolescent), and the BHHRA evaluated several different exposure scenarios under residential, worker, and visitor conditions. Untreated groundwater is not used as a drinking water source at the Site; however, for purposes of evaluating risks from exposure to contaminants in groundwater the BHHRA assumed residential use of groundwater in the absence of treatment because the NJDEP has designated the aquifer as being a Class II-A drinking water source. The frequency of exposure for all receptors is the same under both current and future timeframes. Potential exposure routes evaluated for these receptors included ingestion, inhalation, and dermal contact with COPCs in surface water, designated by the NJDEP as FW2-NT (fresh water body-non-trout), and groundwater.

The toxicity assessment identified potential effects generally associated with exposure to the COPCs. Two types of toxic effects were evaluated for each receptor in the risk assessment: carcinogenic effects and noncarcinogenic effects. Calculated risk estimates for each receptor were compared to EPA’s range of carcinogenic risk of $1x10^{-6}$ (one-in-one million, or one additional incidence of cancer in a population of one million people, based on exposure to the site-related contaminants under the scenarios described in the BHHRA) to $1x10^{-4}$ (one-in-ten thousand), and EPA’s target noncancer hazard quotient less than or equal to a target value of one.

WHAT IS RISK AND HOW IS IT CALCULATED?

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

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

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

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

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

Table A. Summary of hazards and risks associated with groundwater.

Overburden GW	Cancer Risk	Hazard Index
Future Child Resident	**1x10E-2**	**2,500**
Future Adult Resident	**2x10E-2**	**950**
Construction Worker	5x10E-5	**4.5**
Site Worker	**3x10E-3**	**94**
Intermediate Bedrock		
Future Child Resident	**1x10E-3**	**97**
Future Adult Resident	**1x10E-3**	**40**
Site Worker	**2x10E-4**	**5**
Deep Bedrock		
Future Child Resident	**2x10E-4**	**18**
Future Adult Resident	**3x10E-4**	**8**
Site Worker	8x10E-5	**1.1**
Public Water Supply w/o Treatment		
Future Child Resident	**2x10E-4**	**52**
Future Adult Resident	**3x10E-4**	**26**
Site Worker	8x10E-5	**6**

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

The risk characterization combined the exposure and toxicity information to determine estimated risks to the selected exposure groups. The BHHRA concluded that the untreated groundwater including the overburden, intermediate and deep bedrock, and the public water supply, if untreated, pose risks exceeding EPA's acceptable cancer or noncancer target levels for the child and adult resident, construction worker and Site worker receptors. See Table A above. The principal COCs exceeding risk based levels calculated for human health risk in the overburden due to ingestion, and inhalation of groundwater, are VOCs. Other COCs contributing to risk in these areas include 1,4-dioxane. As an example, for the future child resident, the risks and hazards from ingestion of overburden groundwater were as follows: benzene (cancer risk of $3.3x10^{-5}$ and HQ of 1.7), carbon tetrachloride (cancer risk of $1.8x10^{-3}$ and HQ of 74), chloroform (cancer risk of $1x10^{-4}$ and HQ of 3.8), cis-1,2-DCE (HQ of 18), PCE (cancer risk of $3x10^{-5}$ and HQ of 35), TCE (cancer risk of $1x10^{-3}$ and HQ of 280), vinyl chloride (cancer risk of $5.8x10^{-4}$ and HQ of 1.6). These compounds, and the other compounds identified as COCs in Table B, also exceed state and federal drinking water quality standards. No threats to human health due to COPCs were found in the surface water throughout the Site. However, several COCs were detected in the surface water above state and federal surface water quality standards. A complete list of COCs can be found in Table B.

Ecological Risk Assessment:

A screening-level ecological risk assessment (SLERA) was also performed that describes existing habitats and ecological receptor species that have been noted or are expected to be present on the Site, and evaluates the potential risks associated with the exposure of the biota to surface water and sediment COPCs. EPA uses an 8-step process, including numerous scientific/ management decision points, for evaluating potential risks to potential receptors. The SLERA is intended to allow a rapid determination as to whether the Site either poses no ecological risks, or to identify which contaminants and exposure pathways require further evaluation. Using conservative assumptions about potential ecological risks, if no risks are estimated during the screening level evaluation, the ecological risk assessment process stops with the SLERA. If ecological risks are indicated by the SLERA, EPA may proceed to a more comprehensive baseline ecological risk assessment (BERA) to further refine and better evaluate the site-specific ecological risk.

Based upon the SLERA, historic releases associated with the Site are not causing adverse effects to aquatic biota in Henderson Brook. While the presence of VOCs (and other COCs) has been detected in the overburden groundwater and surface water at elevated levels, the surface water does not show Site-related impacts that would pose an ecological risk to the Henderson Brook aquatic system. Therefore, no further ecological investigation is necessary. It is important to note that this evaluation is based on current Site conditions. Risk will be re-evaluated in the future if Site conditions change.

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 human health and the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Based on the site-specific human health and ecological risk assessment results, VOCs in groundwater pose an unacceptable human health risk, and the following remedial action objectives (RAOs) address those risks at the Site:

- Prevent or minimize current and future exposure (via ingestion, dermal contact and inhalation) to Site-related contaminants in groundwater and surface water at concentrations greater than federal and state standards.
- Restore the impacted aquifer to its most beneficial use as a source of drinking water by reducing Site-related contaminant levels to the most stringent of federal and state standards.
- Restore the impacted surface water to its most beneficial use by reducing Site-related contaminant levels to the most stringent of federal and state standards.
- Minimize the potential for further migration of groundwater containing Site-related contaminants at concentrations greater than federal and state standards.

Preliminary Remediation Goals:

The preliminary remediation goals (PRGs) for groundwater and surface water are identified in Table B. PRGs are developed for the COCs identified in this document to aid in defining the extent of the contaminated media requiring remedial action. PRGs are generally chemical-specific remediation goals for each medium and/or exposure route that are established to protect human health and the environment. They can be derived from applicable or relevant and appropriate requirements (ARARs), risk-based levels (human health and ecological), and from comparison to background concentrations, where available. In addition, the State of New Jersey is in the process of promulgating MCLs for PFOA and PFOS, which were detected at the WMWF. While not yet finalized, these standards are To Be Considered (TBCs) advisories, criteria or guidelines used as cleanup goals. The New Jersey recommended health-based MCLs for PFOA and PFOS is 14 ng/L and 13 ng/L, respectively.

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 and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) of CERCLA 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) of CERCLA, 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants 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 presented in this Proposed Plan for addressing the site-wide groundwater contamination is provided in the FS Report, dated June 2018.

The construction time for each alternative listed below 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, and procure the contracts for design and construction.

Common Elements

Each remedial alternative except Alternative 1 (No Action) includes long-term monitoring (LTM), and institutional controls. LTM will be implemented to ensure that groundwater and surface water quality improves following implementation of these alternatives until clean up levels are achieved. Institutional controls are administrative and legal controls that help to minimize the potential for human exposure to contaminants. Institutional controls in the form of a classification exemption area/well restriction area (CEA/WRA) would be implemented along with all alternatives except the No Action alternative. Institutional controls limit future use of the Site groundwater and are common components of each of the alternatives.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water 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 remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

Alternative 1 - No Action

Total Capital Cost	$0
Annual O&M	$0
Total Present Worth	$0
Timeframe	Not Applicable

The NCP requires that a "No Action" alternative be developed and considered as a baseline for comparing other remedial alternatives. Under this alternative, there would be no remedial action conducted at the Site. This alternative does not include any monitoring or institutional controls.

This alternative is not protective and long-term human health effects would remain above EPA's acceptable risk levels. There are no five-year reviews for a No Action alternative.

Alternative 2 – Groundwater Recovery and Ex-Situ Treatment, Long-Term Monitoring and Institutional Controls

Total Capital Cost	$5,209,000
Annual O&M	$441,545 (avg.)
Total Present Worth	$19,500,000
Timeframe	30 yrs. O&M

This remedial alternative consists of utilizing the existing groundwater recovery and air stripping treatment systems at each facility (located at Fisher, 18-01 Pollitt Drive, and the WMWF) to continue removing and treating groundwater contaminated with VOCs. See Figure 8. In addition, the WMWF water supply treatment system would be enhanced to treat for 1,4-dioxane and PFOA/PFOS. During these enhancement activities, the WMWF system would continue to operate and discharge treated water to Henderson Brook under a NJPDES in compliance with substantive NJPDES permit discharge requirements.

The existing WMWF operates two municipal wells (FL-10 and FL-14) at a combined flow rate of 150 gallons per minute (gpm). It is estimated that annual mass removal of VOCs and 1,4-dioxane from the existing WMWF would be approximately 535 pounds per year. If the other two municipal wells (FL-11 and FL-12) are restarted as part of the existing WMWF, a cumulative flow rate of 300 gpm would remove and treat up to 1,075 pounds of VOCs and 1,4-dioxane per year.

An advanced oxidation process (AOP) to treat VOCs and 1,4-dioxane, and liquid-phase granular activated carbon (LGAC) to treat VOCs and PFOA/PFOS prior to chlorination and entry into the water supply would enhance the WMWF in addition to the technologies used. Figure 9 illustrates the conceptual treatment process for the water supply enhancement in comparison to the current air stripper system. The treatability study to be completed during the remedial design phase will determine the final components of the treatment system. It is likely that one ultra-violet light with hydrogen peroxide (UV/H202) AOP unit would be suitable to treat the 1,4-dioxane, and three 10,000-pound LGAC vessels may be sufficient to treat excess hydrogen peroxide (H202), VOCs and PFOA/PFOS. A pH adjustment process is included to control the natural scaling effects of elevated hardness and total dissolved solids in the water at the Site, and minimize operation issues. The footprint of a treatment building would be about 1,200 square-feet and placed adjacent to the existing air stripper to utilize the piping and utilities to the extent possible.

The remedy would also include installing an additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence and contaminant removal of the 1,4-dioxane plume.

Any decision regarding the final operation design of the WMWF upgrade will be made in coordination with the Borough, the NJDEP and EPA during the preparation of the engineering design of the selected remedy. The Borough would evaluate whether the treated water from the WMWF would be used as a water supply source. If the treated water from the WMWF is used as a water supply source, the new treatment equipment would become part of the water supply system. For purposes of estimating costs, it is assumed that the intended use of treated water is for drinking water
During the remedial design, groundwater modeling and capture zone analysis would be performed to estimate

the hydraulic influence of the existing pump-and-treat systems and to identify potential gaps in the capture zones. This new information would be used to determine the location of the recovery well(s), if necessary.

For the conceptual design, EPA estimates that all four WMWF wells would be utilized at a combined estimated flow rate of 300 gpm, and one bedrock recovery well would be installed in the southern portion of the 1,4-dioxane plume at a pumping rate between 25 and 50 gpm, with treatment assumed to be AOP (for 1,4-dioxane) and LGAC (for VOCs and PFOA/PFOS) before being distributed for consumption. The treatability study to be completed during the remedial design phase will determine the final components of the treatment system.

For cost estimating and planning purposes, a remediation duration of 30 years was used for developing costs associated with O&M activities. It was assumed that active remediation would be employed in the targeted treatment areas until MCLs of COCs are attained. However, an estimated timeframe using change in concentrations over time (6 years of data) for reducing contaminant levels to below cleanup standards at the Site would be approximately 36 to 40 yrs.

Under this alternative, the pumping rates established for groundwater recovery would mitigate COCs migrating to the Henderson Brook.

LTM would be performed by collecting groundwater and surface water data to evaluate the effectiveness of groundwater recovery. It assumes 46 existing groundwater and surface water locations, and four additional monitoring wells (if needed) would be used to measure groundwater quality.

An institutional control, in the form of a CEA/WRA, would restrict wells from being installed in the contaminated groundwater area.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water 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 remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

Alternative 3 – Groundwater Recovery and Ex-Situ Treatment, AV/SVE with In-Well Air Stripping, Aerobic Cometabolic Bioremediation, Long-Term Monitoring and Institutional Controls

Total Capital Cost	$14,009,000
Annual O&M	$430,232 (avg.)
Total Present Worth	$28,900,000
Timeframe	30 yrs. O&M

Similar to Alternative 2, this remedial alternative includes the existing groundwater recovery and ex-situ treatment systems along with the appropriate upgrades to address VOCs, 1,4-dioxane, and PFOA/PFOS contamination at the WMWF. This remedial alternative also includes in-situ air sparging (AS)/soil vapor extraction (SVE) with in-well air stripping, and aerobic cometabolic bioremediation systems to address the VOCs and 1,4-dioxane contaminant mass in the most concentrated areas of the groundwater plume.

In-well air stripping, a modified AS/SVE technique, combines the two technologies with air stripping, groundwater extraction and re-circulation to address the VOCs and 1,4-dioxane in overburden groundwater. Stripped contaminants are recovered and transferred to an above ground vapor-phase granular activated carbon (VGAC) unit for effluent vapor treatment.

In-well air stripping would require a pilot test to assess feasibility and determine the radius of influence (ROI) for the treatment area. For purposes of developing a conceptual design and cost estimate for comparison with other technologies, a total of 43 wells with a 60-foot ROI would cover the proposed treatment area (of 105,700 square feet) in the overburden on private property to target groundwater contaminated with PCE concentrations ranging from 100 μg/L to 1,000 μg/L.

In addition, in-situ aerobic cometabolic bioremediation through gas infusion would address the 1,4-dioxane impacts in the intermediate bedrock source area(s). In this process, microbes derive energy from the metabolism of propane/oxygen which releases enzymes that degrade 1,4-dioxane. The oxygen/propane saturated groundwater migrates by advective flow path, further increasing the ROI around the gas infusion well.

Only areas with 1,4-dioxane concentrations higher than 4 μg/L (10 times the GWQS) would be addressed using aerobic cometabolic bioremediation. LTM would assess reduction of mass over time for areas with 1,4-dioxane concentration below 4 μg/L.

Since gas infusion is a relatively new technology and has limited demonstration in the bedrock, full scale implementation would require feasibility testing of gas infusion with a microcosm study and a pilot test.

Full-scale implementation would include an injection well network, gas infusers, gas cylinders, below grade piping to connect gas infusers to gas cylinders, and gas cylinder storage areas. Below-grade piping would be installed 6 inches to 1 foot below grade. For purposes of cost estimation, it is assumed that ROI is 30 feet, indicating that around 80 injection wells are needed to cover the treatment area, and that five gas infusers would be sufficient for each injection well.

As with Alternative 2, this alternative would also utilize the pumping rates established for groundwater recovery to mitigate COCs from migrating to the Henderson Brook. In addition, the in-situ AS/SVE and aerobic cometabolic bioremediation systems would reduce contaminant mass in the groundwater thus reducing the concentrations in the brook.

The estimated timeframe for reducing concentrations to below standards is the same as Alternative 2 (about 36 to 40 yrs.) except this timeframe could be reduced if the in-situ treatments (AS/SVE and aerobic cometabolic bioremediation) prove to be effective during the remedial design/treatability study.

LTM would also be performed to collect groundwater and surface water data to evaluate the effectiveness of the groundwater treatment.

While this alternative would ultimately result in a reduction of contaminant levels in groundwater and surface water 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 remedy would be reviewed at least once every five years until remediation goals are achieved for unrestricted use and unlimited exposure.

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. See box entitled, "The Nine Superfund Evaluation Criteria", below for a more detailed description of these evaluation criteria.

This section of the Proposed Plan evaluates the relative performance of each alternative against the nine criteria, noting how each compares to the other options under consideration. A detailed analysis of alternatives can be found in the May 2018 FS Report.

Overall Protection of Human Health and the Environment

Alternative 1 (No Action) would not meet the RAOs and would not be protective of human health and the environment since no action would be taken.

Alternatives 2 and 3 are the active remedies that address groundwater contamination and would restore groundwater quality over the long-term. Protectiveness under Alternatives 2 and 3 requires a combination of actively reducing contaminant concentrations in groundwater and limiting exposure to residual contaminants through existing institutional controls for groundwater use restrictions until RAOs are met. In addition, protectiveness under Alternatives 2 and 3 relies upon the continued effectiveness of wellhead treatment along with appropriate upgrades at the supply wells impacted by the contamination to ensure that the water distributed by these wells continues to meet state and federal drinking water standards.

Alternatives 2 and 3 include LTM to assess the effectiveness of the remedy. If necessary, additional recovery well(s) and treatment unit(s) would be implemented based on data collected during the remedial design. Also, an institutional control in the form of an NJDEP CEA/WRA would prohibit the installation of groundwater wells used for drinking purposes, and a LTM program for groundwater and surface water to assess the effectiveness of the remedy over time.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

EPA and NJDEP have promulgated MCLs (40 CFR

Part 141 and N.J.A.C. 7:9C, respectively), which are enforceable standards for various drinking water contaminants (and are chemical-specific ARARs). If any state standard is more stringent than the federal standard, then compliance with the more stringent ARAR is required. As groundwater within Site boundaries is a source of drinking water, achieving the more stringent of the federal MCLs, New Jersey MCLs, and New Jersey Groundwater Quality Standards (NJGWQS) in the groundwater is an ARAR.

Alternative 1 would not comply with ARARs. Action specific ARARs do not apply to this alternative since no remedial action would be conducted.

THE NINE SUPERFUND EVALUATION CRITERIA

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

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

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

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

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

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

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

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

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

Alternatives 2 and 3 would achieve chemical-specific ARARs, including New Jersey Ground Water Quality Standards, N.J.A.C. 7:9C, and New Jersey Primary Drinking Water Standards – Maximum Contaminant Levels, N.J.A.C. 7:10-5.2, through extraction and *ex-situ* treatment of contaminated groundwater.

Alternative 3 would achieve chemical specific ARARs through in-well AS/SVE and aerobic cometabolic bioremediation;

For Alternatives 2 and 3, location- and action-specific ARARs would be met, including compliance with treatment requirements for air emissions and water quality discharge criteria, if applicable.

Long-Term Effectiveness and Permanence

Alternative 1 would not provide long-term effectiveness and permanence since groundwater contamination would not be addressed. Alternatives 2 and 3 are considered effective technologies for treatment to contain and restore the contaminated groundwater.

Alternatives 2 and 3 rely on a combination of treatment and institutional controls to achieve long-term effectiveness and permanence.

Alternative 2 would be more reliable than Alternative 3 since there is uncertainty as to whether in-well vapor stripping and bioremediation could effectively remove contamination. Air stripping and AOP have been proven to be effective technologies in reducing the concentrations of VOC contaminated groundwater in the treatment area.

Alternative 3, AS/SVE with in-well stripping, could potentially be effective and reliable at significantly removing the VOC contamination in groundwater. However, implementing this technology has not been demonstrated. The effectiveness of this alternative is limited by the ROI of the treatment system. The ROI will depend on pumping capacity of each stripping well and hydrogeologic characteristics of the aquifer. The effectiveness of this alternative could also be limited due to the possibility that creation of a circulation cell may not be possible because of the potential influence from pumping of nearby public supply wells. A pilot study would be conducted to evaluate the ROI, to determine the effectiveness of in-well stripping and to obtain specific design parameters prior to full scale implementation.

AS/SVE with in-well air stripping and aerobic cometabolic bioremediation can, under some circumstances, accelerate contaminant mass reduction, but may not be effective at accelerating remediation over the existing GWTS. Alternative 3 is expected to have a similar overall duration of the remediation as Alternative 2.

Alternatives 2 and 3 would both control risk to human health through the implementation of institutional controls until RAOs are achieved.

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

Alternative 1 (No Action), does not address the contamination through treatment, so there would be no reduction in TMV and the alternative does not include long-term monitoring of groundwater conditions. Alternatives 2 and 3 would provide the greatest reduction of toxicity, mobility, and volume of contaminants through treatment of contaminated groundwater.

Alternative 2 removes contaminated groundwater via extraction and treats the contamination via air stripping, AOP and liquid phase granular activated carbon at the treatment plant and is anticipated to be the most reliable alternative for reducing TMV through treatment because these are proven technologies.

Alternative 3, AS/SVE with in-well stripping or aerobic cometabolic bioremediation may result in reductions in the volume of contaminants in the intermediate bedrock and overburden beyond those reductions achieved by the existing pump and treat systems alone, and is anticipated to be the next most reliable at reducing TMV. However, its effectiveness must be demonstrated and verified in a pilot study.

Short-Term Effectiveness

Alternative 1 would not have short-term impacts since no action would be implemented.

Alternatives 2 and 3 may have short-term impacts to remediation workers, the public, and the environment during implementation. Remedy-related construction (e.g., trench excavation) under Alternatives 2 (estimated construction timeframe of 6 months) would require disruptions in traffic and street closure permits. In addition, Alternative 2 and Alternative 3 (estimated construction timeframe of 6-12 months) have aboveground treatment components and infrastructure that may create a minor noise nuisance and inconvenience to residents during construction.

Exposure of workers, the surrounding community, and the local environment to contaminants during the implementation of Alternatives 2 and 3 is expected to be minimal. Drilling activities, including the potential installation of wells for monitoring, extraction, and treatment for Alternatives 2 and 3 could produce contaminated liquids that present some risk to remediation workers at the Site. The potential for remediation workers to have direct contact with contaminants in groundwater could also occur when groundwater remediation systems are operating under Alternatives 2 and 3. Alternatives 2 and 3 could increase the risks of exposure through ingestion, inhalation, and dermal contact of contaminants by workers because contaminated groundwater would be extracted to the surface for treatment. However, occupational health and safety controls would be implemented to mitigate exposure risks.

Among the active alternatives, Alternative 2 would have the lowest short-term impact to the community. Alternative 3 would have more short-term impacts to the community than Alternative 2 since more wells would be installed and the in-well stripping system would require more space for the installation of multiple well vaults to hold necessary equipment, valves, and fittings. In-well stripping system operations might generate noise that could be harder to mitigate.

For Alternatives 2 and 3, implementation of a health and safety plan, traffic controls, noise control and managing the hours of construction operation could minimize the impacts to the community. Health and safety measures implemented during operation and maintenance activities would protect Site workers.

Both Alternatives 2 and 3 have similar timeframes for achieving RAOs.

Implementability

Alternative 1 requires no action, and therefore would be the easiest of all the alternatives to implement. Alternatives 2 and 3 are both implementable, although each present different challenges. Alternative 2 is readily implementable since ground water recovery and ex-situ treatment is a well-established remedial technology with commercially available equipment.

Alternative 3 incorporates similar features as Alternative 2 with the addition of in-situ active remediation systems (AS/SVE with in-well stripping and aerobic cometabolic bioremediation) in select areas of the Site. Alternative 3 requires treatability studies and pilot tests to assess the effectiveness of remediation technologies for the Site. The AS/SVE with in-well air stripping occurs solely within the well. This process depends upon the same flushing mechanism and would be no more effective than with conventional pump and treat systems. The gas infusion technology approach for aerobic cometabolic bioremediation is a relatively new technology that requires pilot testing to ensure efficacy with no guarantee of an accelerated clean-up time. There are a limited number of vendors available for the construction of in-well air stripping technology and gas infusion technology, which may limit the competitiveness of bids.

Alternative 1 does not require any permits. In accordance with CERCLA, no permits would be required for on-site work for Alternatives 2 and 3 (although such activities would comply with substantive requirements of otherwise required permits).

Alternative 3 requires construction on private properties and installation of numerous wells and related systems. If an additional recovery well is needed on-Site, both Alternative 2 and Alternative 3 may need to comply with substantive requirements of road opening permits of building permits for ex-situ treatment systems.

Alternative 2 is more readily implementable relative to Alternative 3.

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

Cost

The estimated capital cost, O&M, and present worth cost are discussed in detail in the May 2018 FS Report. For cost estimating and planning purposes, a 30-year time frame and a discount rate of 7% were used for developing present worth costs under Alternatives 2 and 3. The cost estimates are based on the available information. Alternative 1 (No Action) has no cost because no activities would be implemented. The highest present worth cost is Alternative 3 at $28.5 million. Of the two alternatives with active remedial components, Alternative 2 is the least expensive at $19.5 million. The estimated capital, O&M, and present-worth costs for each of the alternatives are as follows:

Alternative	Capital Cost	Annual O&M Cost	Total Present-Worth Cost
1	$0	$0	$0
2	$5,209,000	$441,545	$19,500,000
3	$14,009,000	$430,232	$28,900,000

State Acceptance

State of New Jersey concurs with the preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and all comments are reviewed. Comments received during the public comment period will be addressed in the Responsiveness Summary section of the Record of Decision (ROD). The ROD is the document in which EPA will select the remedy for the Site.

PREFERRED ALTERNATIVE

Based upon an evaluation of the remedial alternatives, EPA, with the concurrence of NJDEP, proposes Alternative 2 (Groundwater Recovery and Ex-situ Treatment, Long-Term Monitoring and Institutional Controls) as the preferred remedial alternative for the Fair Lawn Well Field Superfund Site. Alternative 2 has the following key components:

Groundwater recovery via pumping and ex-situ treatment of recovered groundwater prior to discharge as a water supply source;

Additional recovery well(s) with treatment unit(s) to capture any areas limited by hydraulic influence;

Long-term groundwater monitoring to assess the effectiveness of the groundwater remedy; and

Implementation of institutional controls.

Active remediation elements would be designed to achieve the RAOs by establishing containment and restoration of groundwater. The extraction and treatment system would operate until remediation goals are attained. The exact number and placement of recovery well(s), pumping rates, and treatment processes, as well as the location of the treatment plant would be determined during the remedial design.

A long-term groundwater monitoring program would be implemented to track and monitor changes in the groundwater contamination to ensure the RAOs are attained. The results from the long-term monitoring program would be used to evaluate the migration and changes in site-related COCs over time.

Institutional controls will be placed to ensure that the remedy remains protective until RAOs are achieved for protection of human health over the long term. Institutional controls are anticipated to include a CEA/WRA to prohibit the use of groundwater for drinking purposes.

Consideration will be given during the remedial design, to technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy. This would include green remediation technologies and practices.

The total estimated, present-worth cost for the selected remedy is $19,500,000. Further details of the cost are presented in Appendix F of the FS Report. 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.

While this alternative would ultimately result in a 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 remedy will be reviewed at least once every five years until remediation goals are achieved for unrestricted use.

Basis for the Remedy Preference

Under Alternative 2, the current pump and treat systems along with the potential for additional recovery well(s), to be determined during the remedial design phase, will provide mass reduction in the long term and hydraulic control of site-related contaminants and ultimately achieve MCLs and risk based levels. As source control efforts continue at the Fisher, Sandvik and 18-Pollitt Drive facilities under NJDEP oversight, the concentration of groundwater contamination will be reduced. Site-related COCs are expected to remain in the groundwater for 36 to 40 years, and institutional controls and long-term monitoring will ensure that human health and the environment are protected during the operation of the pump and treat systems. Alternative 2 will be more reliable than Alternative 3 since there is uncertainty as to whether in-well vapor stripping and bioremediation could effectively remove contamination. Air stripping, AOP and LGAC are effective technologies for reducing the concentrations of the site-related COCs in groundwater. The treatability study to be completed during the remedial design phase will determine the final components of the treatment system. The long-term reliability and effectiveness of the proposed AS/SVE system and aerobic cometabolic bioremediation under Alternative 3 have not yet been well demonstrated. Alternative 3 would not reduce the overall time frame for mass removal compared with Alternative 2.

Alternative 2, groundwater extraction and treatment, is a proven technology which has demonstrated effectiveness at reducing contaminant mass and providing containment to achieve cleanup standards for VOC-contaminated groundwater. While Alternative 3, AS/SVE with in-well vapor stripping and aerobic cometabolic bioremediation has been effective under some site conditions, these technologies would require pilot testing to demonstrate that the in-situ technologies are effective at this Site. Furthermore, the gas infusion aerobic cometabolic bioremediation may not be able to treat areas with concentrations as high as ten times the GWQS for 1,4 dioxane.

Although the densely populated residential area poses some logistical challenges to the implementation of each active remedial alternative, EPA believes that Alternative 2 would be significantly less disruptive than Alternative 3 to the residents. For example, it was estimated for cost estimating purposes that for Alternative 3 a total of 43 wells would be configured in the overburden on private property, with a 60-foot ROI covering the treatment area to target groundwater contaminated with PCE concentrations ranging between 100 µg/L and 1,000 µg/L. A final determination for the number of treatment wells could differ if the 60-foot radius of influence is incorrect.

Based upon the information currently available, EPA believes the preferred alternative meets the threshold criteria *(protection of human health and the environment* and *compliance with ARARs*) and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. 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 as a principal element. 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*), NJDEP concurs with the preferred alternative, and community acceptance will be evaluated upon the close of the public comment period.

COMMUNITY PARTICIPATION

EPA and NJDEP provided information regarding the cleanup of the Fair Lawn Well Field Superfund Site to the public through meetings, the Administrative Record file for the Site, and announcements published in the Bergen Record. EPA and NJDEP encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted. The dates for the public comment period, the date, location and time of the public meeting, and the locations of the administrative record file, are provided on the front page of this Proposed Plan.

For further information on the Fair Lawn Well Field Superfund Site, please contact:

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Written comments on this Proposed Plan should be submitted on or before August 18, 2018 to Mr. Michael Zeolla at the address or email below.

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Figure 1
Site Location

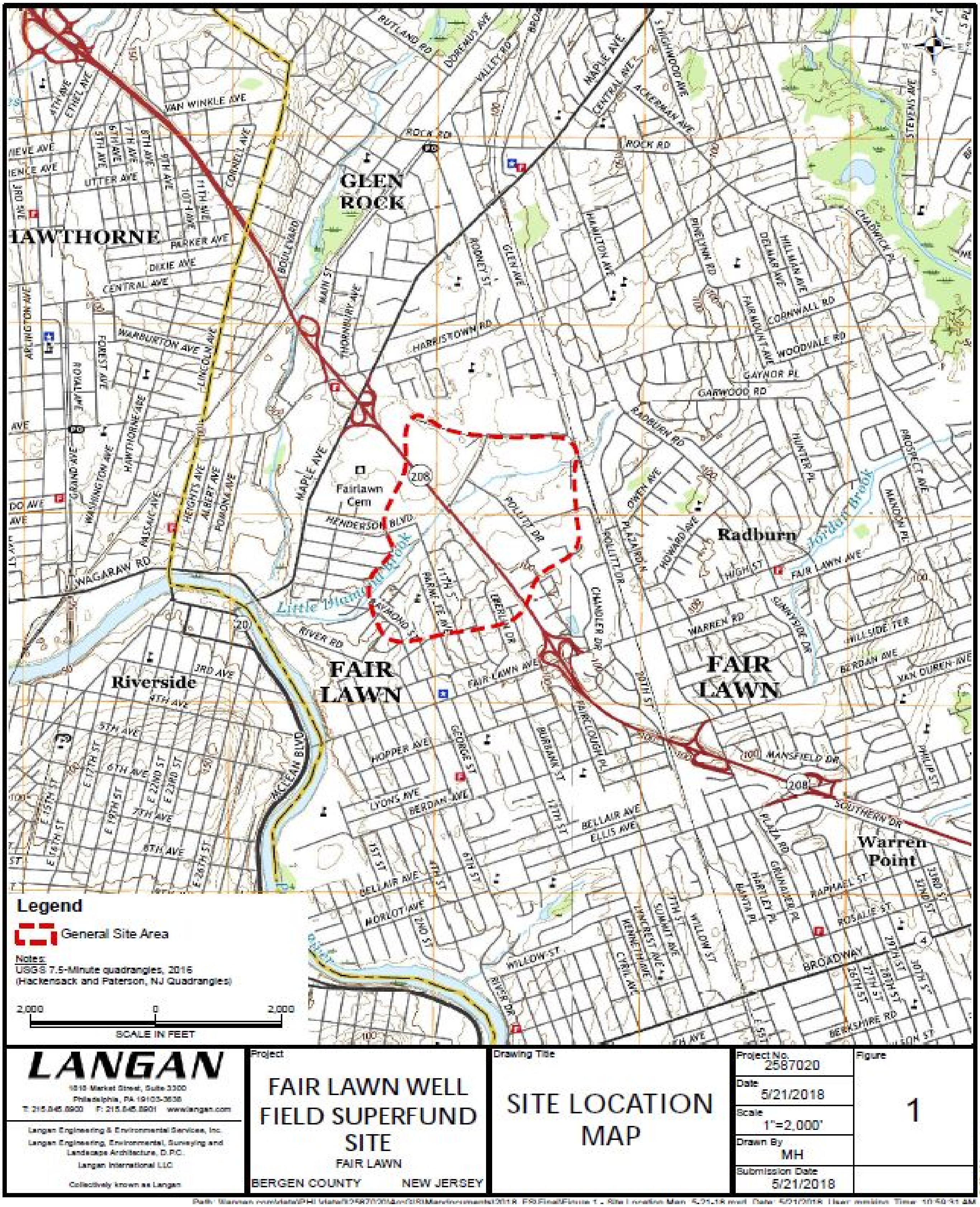

Figure 2
Well Locations

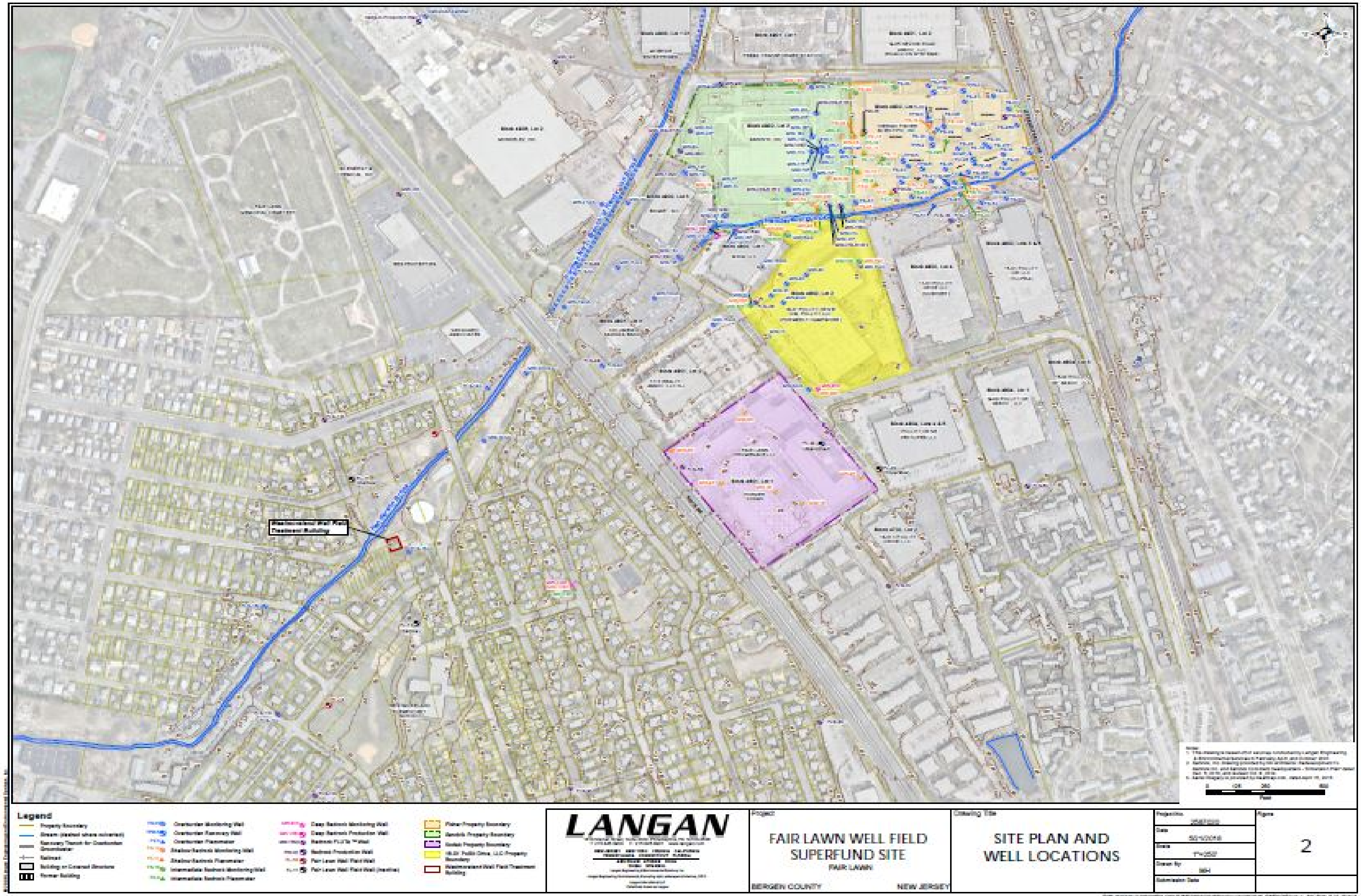

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Figure 3
Overall Plume Extent Map View

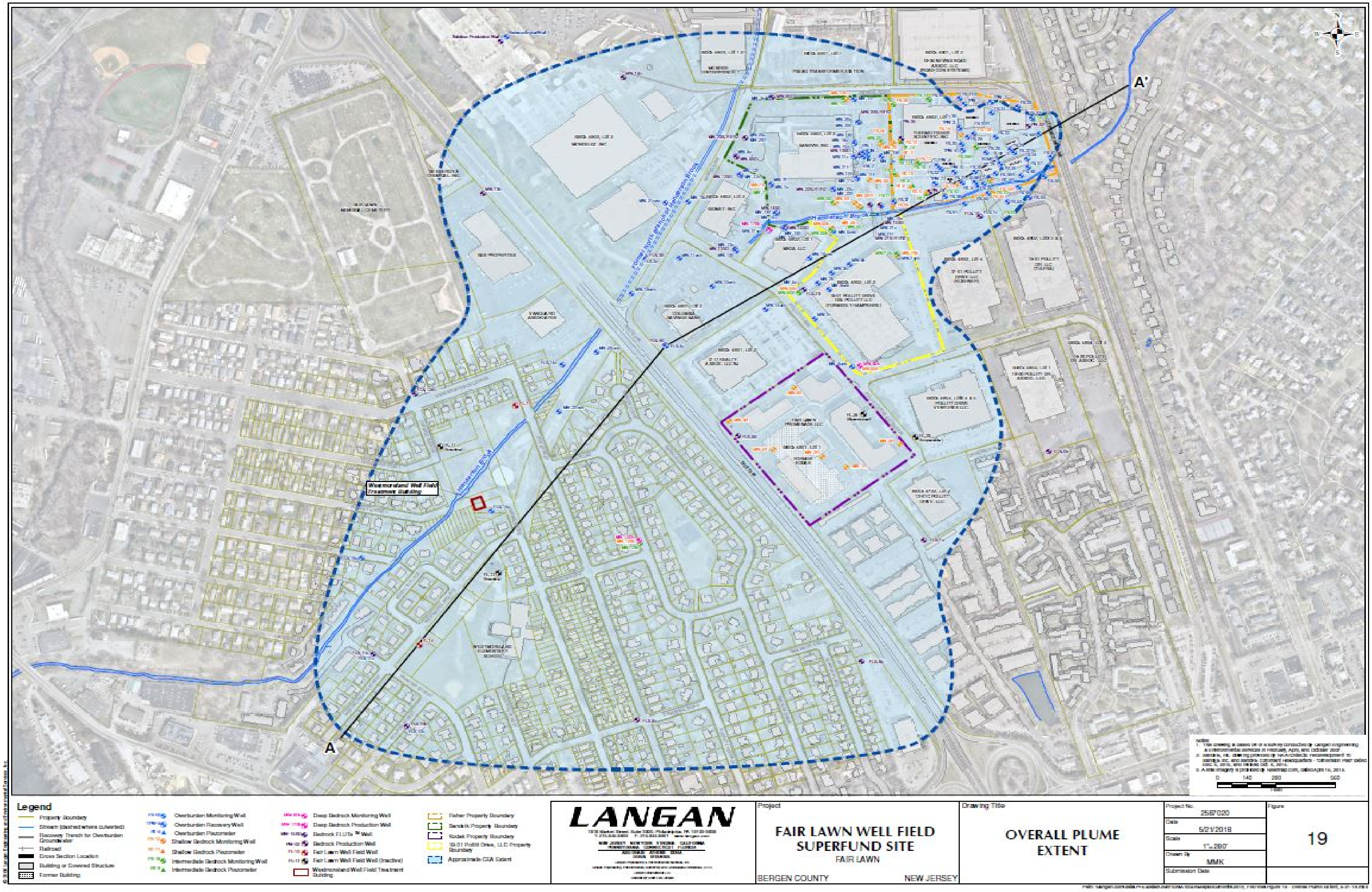

Figure 4
Overall Plume Extent Cross-Sectional

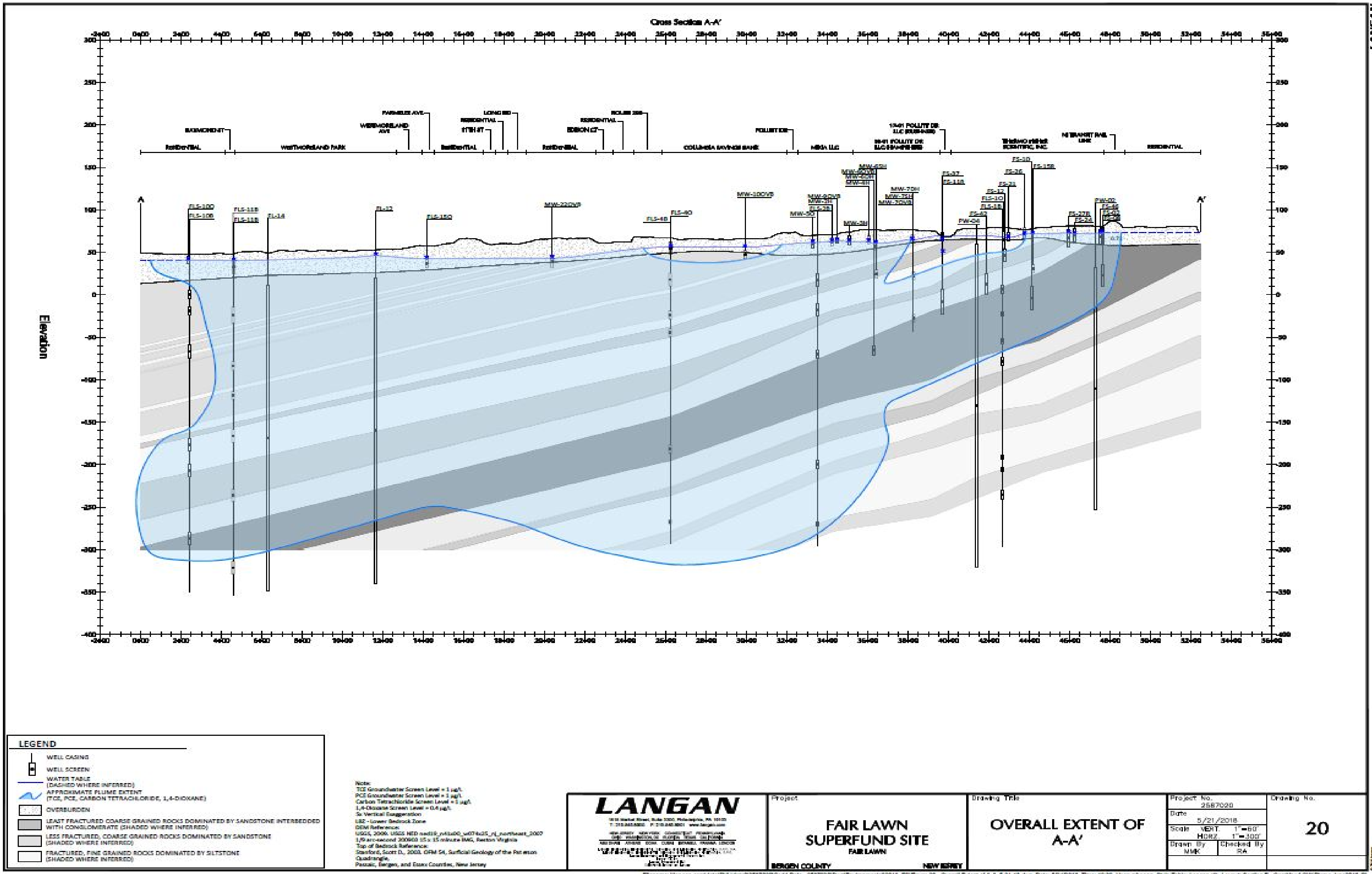

Figure 5
PCE Overburden Plume (2010 - 2016)

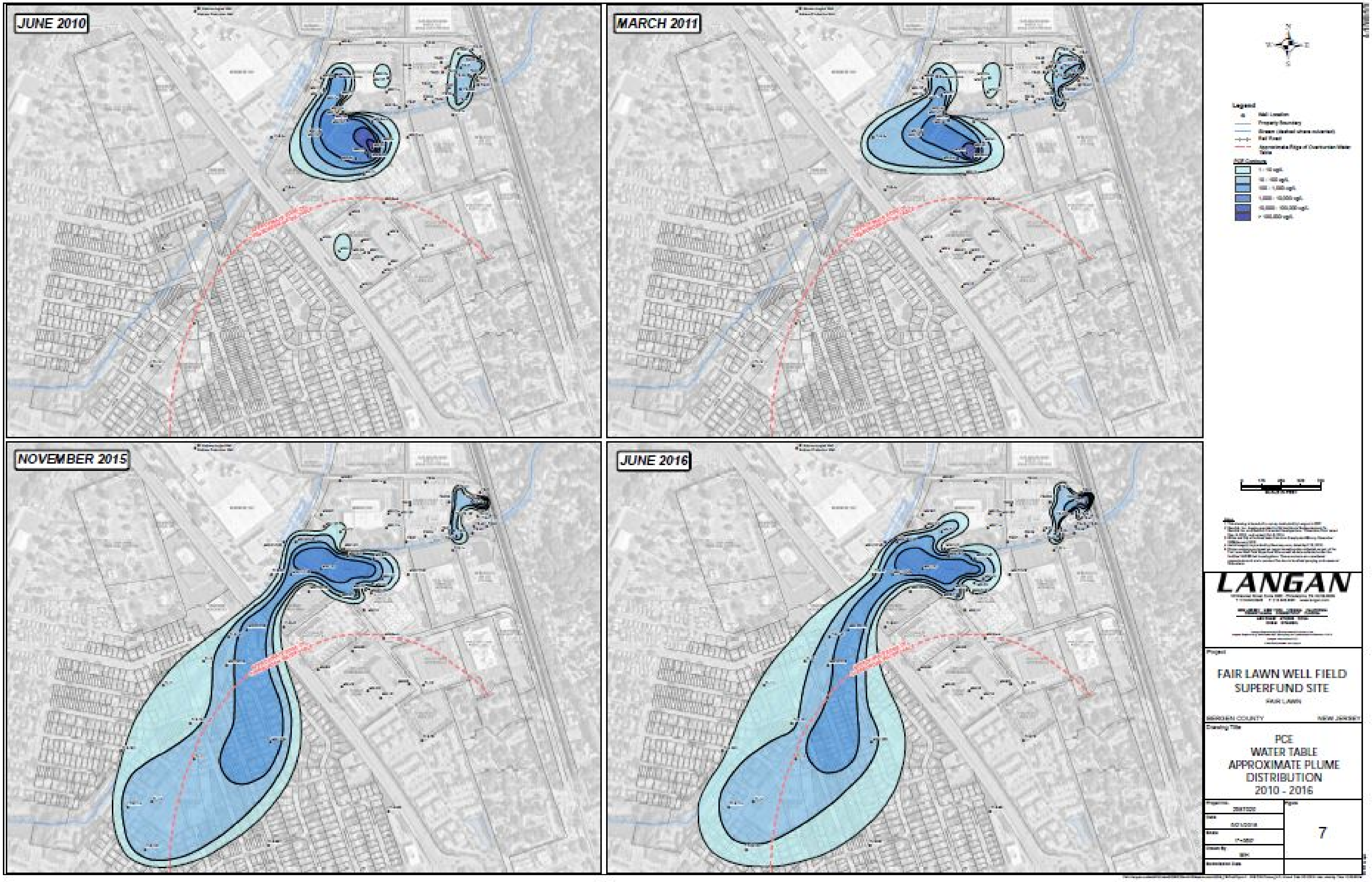

Figure 6
PCE Intermediate Bedrock Plume (2010-2016)

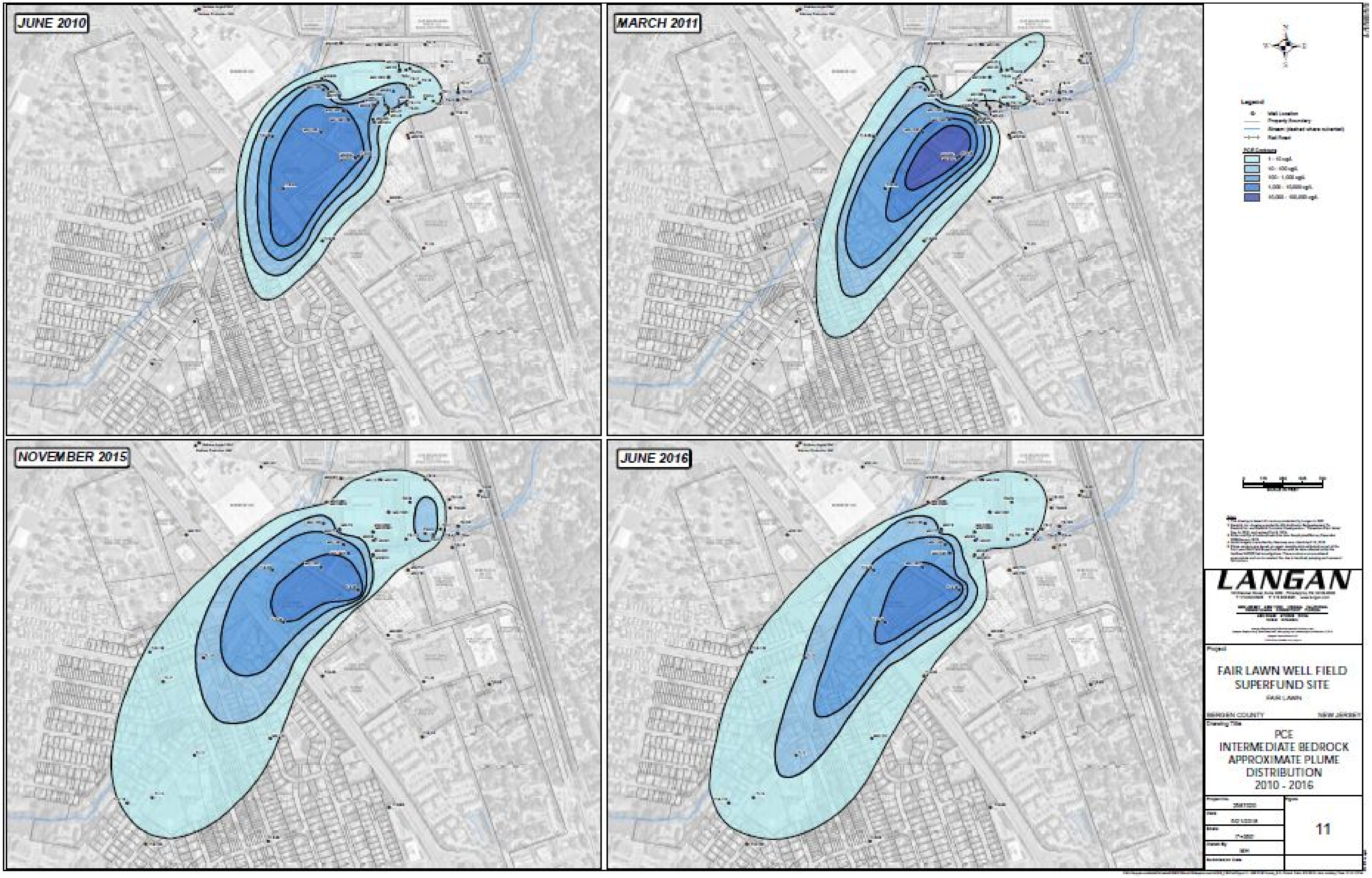

Figure 7
PCE Deep Bedrock Plume (2010-2016)

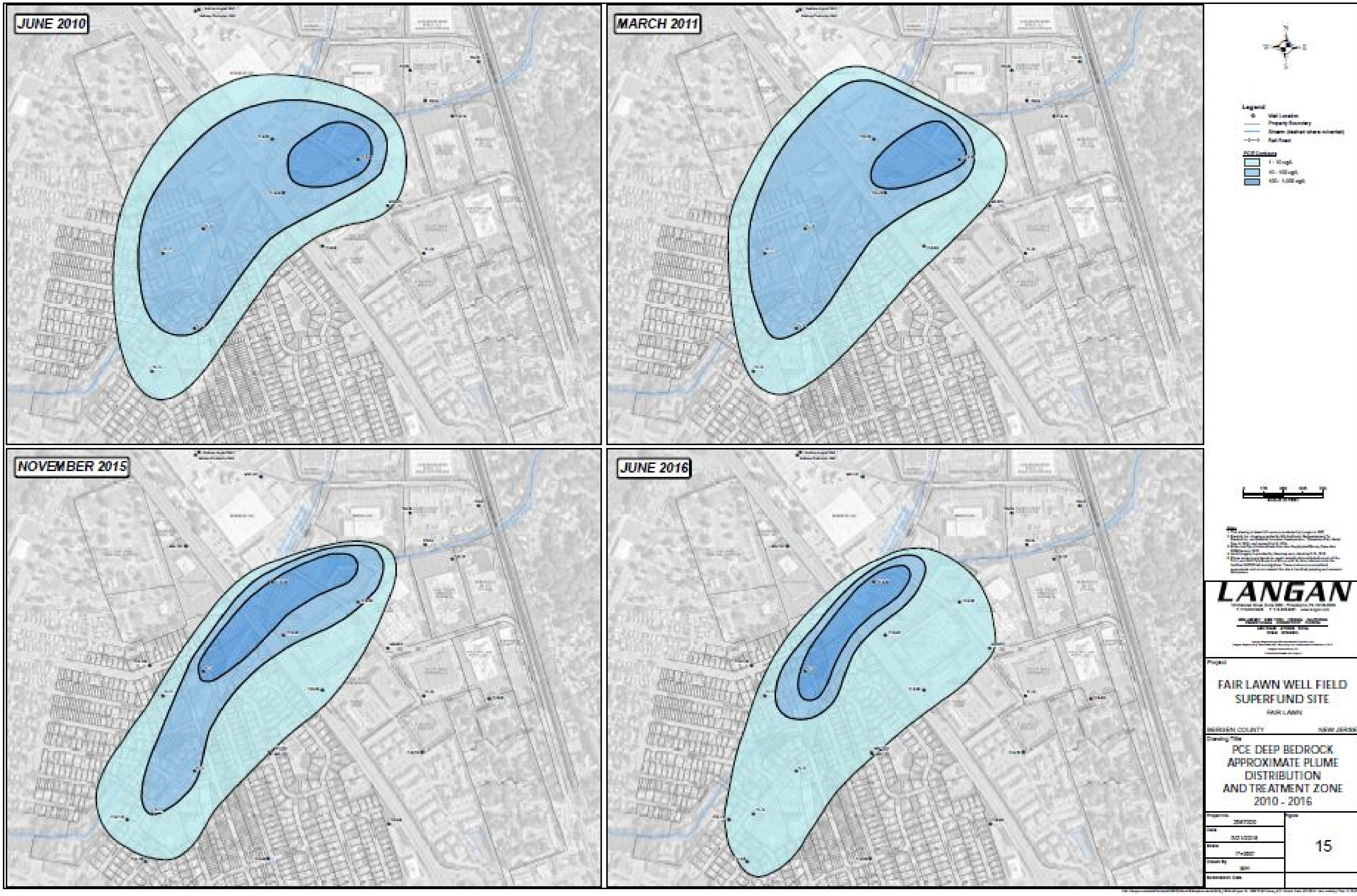

Figure 7
Groundwater Recovery Systems Locations

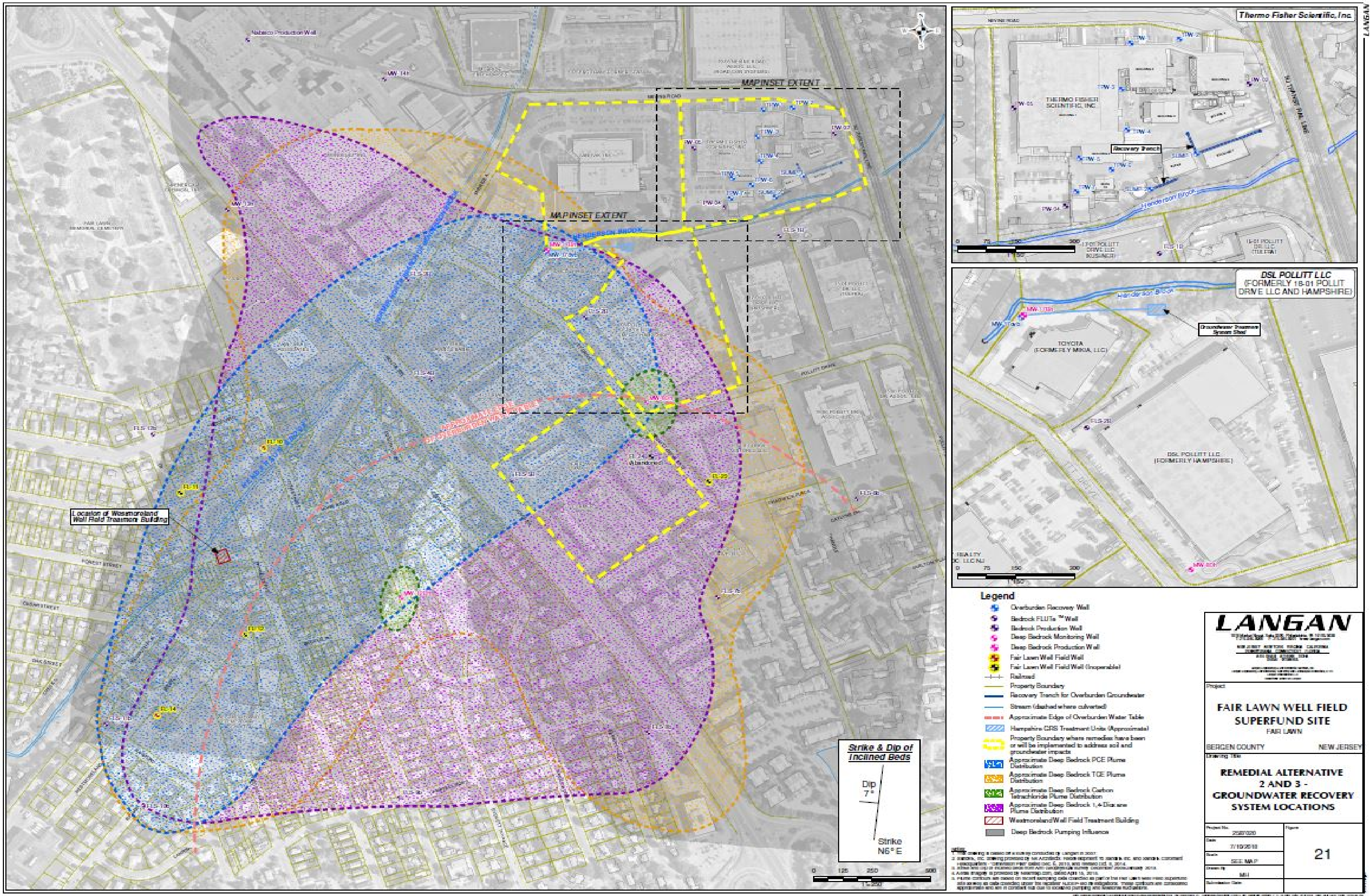

TABLE B
Preliminary Remediation Goals

Site Related Contaminants of Concern Groundwater	CAS Number	NJDEP Groundwater Quality Standards (ug/L)	New Jersey Primary Drinking Water MCLs (ug/L)	New Jersey Secondary Drinking Water MCLs (ug/L)	USEPA Primary Drinking Water MCLs (ug/L)	Preliminary Remediation Goals (ug/L)
Volatile Organic Compounds						
1,1,1-Trichloroethane	71-55-6	30	30	NA	200	30
1,1-Dichloroethane	75-34-3	50	50	NA	NA	50
1,2-Dichlorobenzene	95-50-1	600	600	NA	600	600
1,2-Dichloroethane	107-06-2	2	2	NA	5	2
Benzene	71-43-2	1	1	NA	5	1
Carbon Tetrachloride	56-23-5	1	2	NA	5	1
Chlorobenzene	108-90-7	50	50	NA	100	50
Chloroform	67-66-3	70	NA	NA	80	70
Cis-1,2-dichloroethylene	156-59-2	70	NA	NA	70	70
Ethylbenzene	100-41-4	700	NA	NA	700	700
n-Heptane	142-82-5	100*	NA	NA	NA	100*
Tert-Butyl-Methyl-Ether	1634-04-4	70	70	NA	NA	70
Tetrachloroethylene (PCE)	127-18-4	1	1	NA	5	1
Toluene	108-88-3	600	NA	NA	1000	600
Total Xylene	1330-20-7	1000	1000	NA	10000	1000
Trichloroethylene (TCE)	79-01-6	1	1	NA	5	1
Vinyl Chloride	75-01-4	1	NA	NA	2	1
Semi Volatile Organic Compounds						
1,4-Dioxane (P-Dioxane)	123-91-1	0.4	NA	NA	NA	0.4

Site Related Contaminants of Concern Surface Water	CAS Number	NJDEP Fresh Water Category 2 Non-Trout Bearing Surface Water Quality Standards (ug/L)	USEPA NRWQC for the Consumption of Water and Organisms (ug/L)	Preliminary Remediation Goals (ug/L)
Volatile Organic Compounds				
Benzene	71-43-2	0.15	2.1	0.15
Carbon Tetrachloride	56-23-5	0.33	0.4	0.33
Chloroform	67-66-3	68	60	60
Cis-1,2-dichloroethylene	156-59-2	NA	NA	NA
Tetrachloroethylene (PCE)	127-18-4	0.34	10	0.34
Total Xylene	1330-20-7	NA	NA	NA
Trichloroethylene (TCE)	79-01-6	1	0.6	0.6
Vinyl Chloride	75-01-4	0.082	0.022	0.022
Semi Volatile Organic Compounds				
1,4-Dioxane (P-Dioxane)	123-91-1	NA	NA	NA

Legend

NJDEP New Jersey Department of Environmental Protection
USEPA United States Environmental Protection Agency
NRCQA National Recommended Water Quality Criteria
NA Not Applicable
* - Value listed is an NJDEP interim generic groundwater quality of 100 for non-carcinogens and 5 for carcinogens

Figure 9
Treatment Enhancement Diagram