

***Groundwater and Soil Investigation at the
BOMARC Facility, Westhampton N.Y.
In Accordance with Suffolk County Legislative
Resolution No. 1065-2018***



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Executive Summary:

This report was prepared in response to Suffolk County Resolution 1065-2018 which directed the Suffolk County Department of Health Services (SCDHS) to conduct soil and groundwater testing at the BOMARC property located at Old Country Road in Westhampton. The Division of Environmental Quality Office of Pollution Control (OPC) and Office of Water Resources (OWR) conducted a preliminary environmental assessment of the site. The assessment consisted of the following: records review, personnel interviews, aerial photo survey, site inspection, soil sampling, and a groundwater investigation.

The site is a former military base, which housed BOMARC surface-to-air missiles located in 58 aboveground silos. It was reported that the missiles had nuclear warheads. Military activity ceased at the site in 1969.

The property has approximately 90 developed acres with thirteen commercial buildings, 58 former missile silos, a shooting range, a power plant, several acres of vehicle storage and multiple acres of undeveloped land. The subject property is currently in use by the Suffolk County Police Department, Sheriff's Department, Public Works, and various tenants. Ten buildings are currently occupied.

A records review showed that the site had several asbestos remediations and evidence of lead based paint and mold in certain structures. The OPC database shows 43 historic hazardous material tank records, with 12 petroleum tanks still in service. In 1998, perchlorate was detected in an adjacent Suffolk County Water Authority (SCWA) wellfield and a perchlorate groundwater plume was traced back by SCDHS to fireworks disposal pits located on the BOMARC property. A treatment system was installed at the wellfield to remove perchlorate. The disposal pits are no longer used and fireworks are destroyed in a specially designed unit in one of the missile silos. Records also indicated that several underground leaching structures (UICs, or "underground injection control" structures) were remediated under OPC oversight in 2014.

The initial soil sampling (surface soils and UICs) performed in accordance with Resolution 1065-2018 consisted of 25 samples collected from locations identified as areas of potential environmental concern. All samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOC) and heavy metals. Select samples were also analyzed for PCB's, pesticides and radiation. Soil sampling results were compared to SCDHS standards (UICs only) and New York State Department of Environmental Conservation (NYSDEC) soil cleanup objectives (surface soil samples and all PCB samples).

UIC Results

Four of eleven UIC structures sampled had concentrations of VOCs, SVOCs and/or metals that exceeded Suffolk County standard SOP 9-95, indicating that remediation will be required (see Figure 3a for overview of UIC results). Some of the contaminants detected above standards include: benzene, xylene, chrysene, trimethylbenzene, methyl ethyl ketone, cadmium, chromium, barium, copper and lead. It is not uncommon for these contaminants to concentrate in UIC structures, leading to elevated concentrations that require remediation.

PCBs also exceeded the 6 NYCRR Part 375 soil cleanup objective (SCO) for protection of groundwater in five UICs, three of which also exceed SCDHS SOP 9-95 standards. Samples from floor drains located in building CO206 and CO216 exceeded the SCO by several orders of magnitude (9,560,000 parts per billion (ppb) and 449,000 ppb, respectively, compared to the groundwater protection SCO of 3,200 ppb). Soil Cleanup Objectives were developed by New York State to specify acceptable post-remedial soil concentrations for various site occupancies and uses. For this report, they are used for comparison purposes only. Further discussions with NYSDEC will be necessary to determine remedial requirements for the two UICs that exceeded the PCB groundwater protection SCO but not SCDHS SOP 9-95 standards.

Surface Soil Results

Eight of the fourteen surface soil samples exceeded NYSDEC Unrestricted Use SCOs for VOCs, SVOCs and/or metals (see Figure 3b for overview of surface soil results). Six of those samples also exceeded the Commercial or Protection of Groundwater SCOs, which are possible future remedial goals due to site use and groundwater status. Some of the contaminants detected above the SCOs include: xylene, lead, copper, arsenic, and barium. It should be noted that the sample sites selected were targeted as areas of potential contamination and are not representative of the entire site. Of these six elevated samples, one was an ash sample from the new fireworks burn box, three were soil samples from the shooting range, one was from stained soil adjacent to an aboveground tank, and one was from soil adjacent to a concrete pad suspected of previous hazardous material storage. Elevated concentrations of contaminants in these samples could be expected.

The three samples collected from the firing range had elevated metal concentrations. It is not unusual to find elevated concentration of metals, principally lead, in surface soils at firing ranges. This occurs as a function of the normal operation of the range. Therefore, these detections are not considered hazardous waste disposal while the range is still active and lead is being periodically reclaimed from the range. Suffolk County Police Officers on-

site take precautions to limit exposure to shooting range dust and are routinely monitoring for blood lead levels.

Eight surface soil samples exceeded Unrestricted Use SCOs for PCBs, four exceeded 1.0 parts per million (ppm), the PCB soil concentration for the Residential, Restricted Residential and Commercial SCOs. Due to the prevalence of PCBs in surface soil, a second round of PCB surface soil sampling was performed at 67 locations throughout the site. In the second round of sampling, five samples exceeded the Unrestricted Use SCO. Only one of these samples (behind bldg. C0206) exceeded 1.0 ppm. Additional confirmatory sampling and guidance from the DEC will be required regarding possible remediation.

Five surface soil samples exceeded the Unrestricted Use SCOs for pesticides. None exceeded the Commercial or Protection of Groundwater SCOs. The contaminants detected above their respective SCO include: DDT, aldrin, dieldrin and endrin.

With the possible exception of lead, there is no evidence that the contaminants of concern in UICs or soils have reached groundwater. It should be noted that PCBs were not sampled in groundwater as part of this preliminary investigation, but PCBs typically do not migrate great distances in groundwater in Suffolk County. However, additional soil and groundwater sampling will be performed to ensure that all contaminants have been removed and that groundwater is not impacted by these contaminants.

Groundwater Results

Twenty-eight temporary profile groundwater wells were installed as part of the investigation. Each of the wells were sampled at several levels depending on the depth of the well and height of the water table. The wells were sampled for VOCs, SVOCs, metals, pesticides, radiation, perchlorate and per- and polyfluoroalkyl substances (PFAS).

One groundwater well had three inorganic parameters (chloride, nitrate and sulfide) exceeding their respective groundwater standard. Four metals (iron, lead, manganese and sodium) exhibited concentrations exceeding their drinking water standard, respective action level and/or NYSDEC groundwater standards.

In one groundwater profile well tritium was detected in three of the profile levels, with the reported concentrations significantly below the drinking water standard (MCL). However, since tritium detections in Suffolk County are unusual, six additional wells were installed and sampled. Results showed no additional detections of tritium.

Thirteen profile wells had PFOS and/or PFOA concentrations in excess of the recently adopted New York State MCLs of 10 ng/l for each (see Figures 12-15 for an overview of PFAS results).

Public Water Supply

A public supply wellfield (Old Country Road) is located immediately south of the BOMARC site. The water from this wellfield currently meets all existing drinking water standards. A private well survey was conducted by SCDHS in the vicinity of the SCWA wellfield. PFAS analysis conducted by the New York State Department of Health (NYSDOH) Wadsworth Laboratory found that 25 of the 41 wells sampled had detections of PFOS and/or PFOA. Two wells exhibited combined PFOS and PFOA concentrations above the 70 nanograms per liter (ng/l) (the current USEPA health advisory level). The NYSDEC subsequently installed POET water treatment systems at both locations.

Next Steps

The groundwater and soil sampling data was reported to and discussed with the NYSDEC and the New York State Department of Health. Four UIC systems will require remediation under Suffolk County SOP 9-95. Two additional UICs may require remediation due to PCB contamination. Suffolk County will work with the NYSDEC in developing appropriate remedial action due to PCB contamination in many of these UICs.

On December 5, 2019, Suffolk County was notified that the BOMARC site was being considered a potential inactive hazardous waste disposal site. SCDHS has begun discussion on next steps with NYSDEC, including characterization of other potential PFAS sources of concern in the area, including a former drag racing strip, the Old Westhampton Landfill, possible foam use related to the Pine Barrens Wildfires of 1995, and local sewage treatment plants. Further onsite investigation is also likely.

Introduction

This report was prepared in response to Suffolk County Resolution 1065-2018 (Appendix A) which directed the Suffolk County Department of Health Services (SCDHS) to conduct soil and groundwater testing at the BOMARC property located at Old Country Road, Westhampton, New York. In accordance with this resolution the SCDHS, Division of Environmental Quality, Office of Pollution Control (OPC), and Office of Water Resources conducted a preliminary environmental assessment of BOMARC. On December 5, 2019, Suffolk County was notified by the New York State Department of Environmental Conservation (NYSDEC) that the BOMARC site was being considered a potential inactive hazardous waste disposal site. This was based in part upon data collected by SCDHS as part of the preliminary environmental assessment. The SCDHS has begun a discussion on next steps with the NYSDEC, including evaluating other potential PFAS sources of concern in the vicinity, including a former drag race strip, the former Westhampton Landfill, possible foam use related to the Pine Barrens Wildfires of 1995, and local sewage treatment plants.

The property (Suffolk County Tax map numbers 0900-331.00-01.00-1.1 and 0900-331.00-01.00-2 through 15) currently has thirteen commercial buildings, (58) former missile silos, a shooting range, a power plant, several acres of vehicle storage and multiple acres of undeveloped land. The subject property is currently in use by the Suffolk County (SC) Police Department, SC Sheriff's Department, SC Department of Public Works (DPW), and various tenants for multiple uses. The site currently has ten occupied buildings. A map of the site indicating the occupied buildings, along with a listing of all the site buildings, is included in Appendix G. The site is bordered by a former landfill, which is now a Town of Southampton transfer station for compost; a salt storage barn and a rifle range just east of the BOMARC property; a former drag racing strip which is now the Westhampton Pines development to the west; undeveloped Pine Barrens to the north; and residential homes, and assisted living facility and nursing home and rehabilitation center are located to the south.

A field inspection of BOMARC was performed by OPC in October 2018. Inspection of the entire property was not pursued, as many of the undeveloped acres were not easily accessible by vehicle or on foot. A review of all records for this site contained within the SCDHS Office of Pollution Control was conducted as part of this preliminary environmental assessment.

Records Review

Site History

The subject property consists of approximately 90 developed acres. The remaining acreage is undeveloped. The property occupies Suffolk County Tax Map Numbers: 0900-331.00-01.00-1.1 and 0900-331.00-01.00-2 through 15.

The site is a former military complex that is currently owned by Suffolk County and is used for multiple purposes. Based on the review of the available historical data beginning with the late 1940's, the facility was constructed in Westhampton in 1957 by the US Military and was occupied by the 6th Air Defense Missile Squadron of the US Air Force Air Defense Command and was known as the Suffolk BOMARC (BOMARC – Boeing Michigan Aeronautics Research Center) Base. The primary purpose of the base was to defend the US from enemy aircraft. The facility housed such missiles known as the BOMARC A. The BOMARC A was a Surface-to-Air Cruise Missile (SAM) with a length of 46 feet and armed with a 10-Kiloton nuclear warhead. The facility housed 58 missiles within individual silos; none of the missiles were launched (Figure 1). In 1964, technicians removed their nuclear tips and dismantled the weapons. The military activities ceased in 1969.

There are thirteen buildings on the site. The Suffolk County Police Department (SCPD) primarily uses the location for the storage of vehicles damaged in accidents and needed for evidentiary purposes (approximately 2500 to date). In addition, the site is used by Suffolk County as a police training facility, motor vehicle impound lot, fireworks disposal site, rifle/pistol range, Sheriff's training facility, government archives storage and by various tenants for multiple purposes (Figure 2). The Town of Southampton operates a transfer station for compost, a salt storage barn and a rifle range just east of the BOMARC property; a former drag racing strip which is now the Westhampton Pines development to the west; undeveloped Pine Barrens to the north; and residential homes, and assisted living facility and nursing home and rehabilitation center are located to the south.

A cursory database search and review of the Office of Pollution Control's records revealed the following environmental history of the BOMARC site.

- 1998. SCWA advises SCDHS that two public water supply wells at BOMARC Westhampton are contaminated with perchlorate. Product is often found in fireworks. SCPD has a fireworks disposal area on site, up gradient of the wells.
- 1998. Monitoring wells placed adjacent to the SCPD fireworks burning pit/disposal site identified the pit as a point source of perchlorate contamination.

Figure 1
Suffolk County
Department of Health Services
BOMARC Facility & Vicinity - 1962
Westhampton, N.Y.



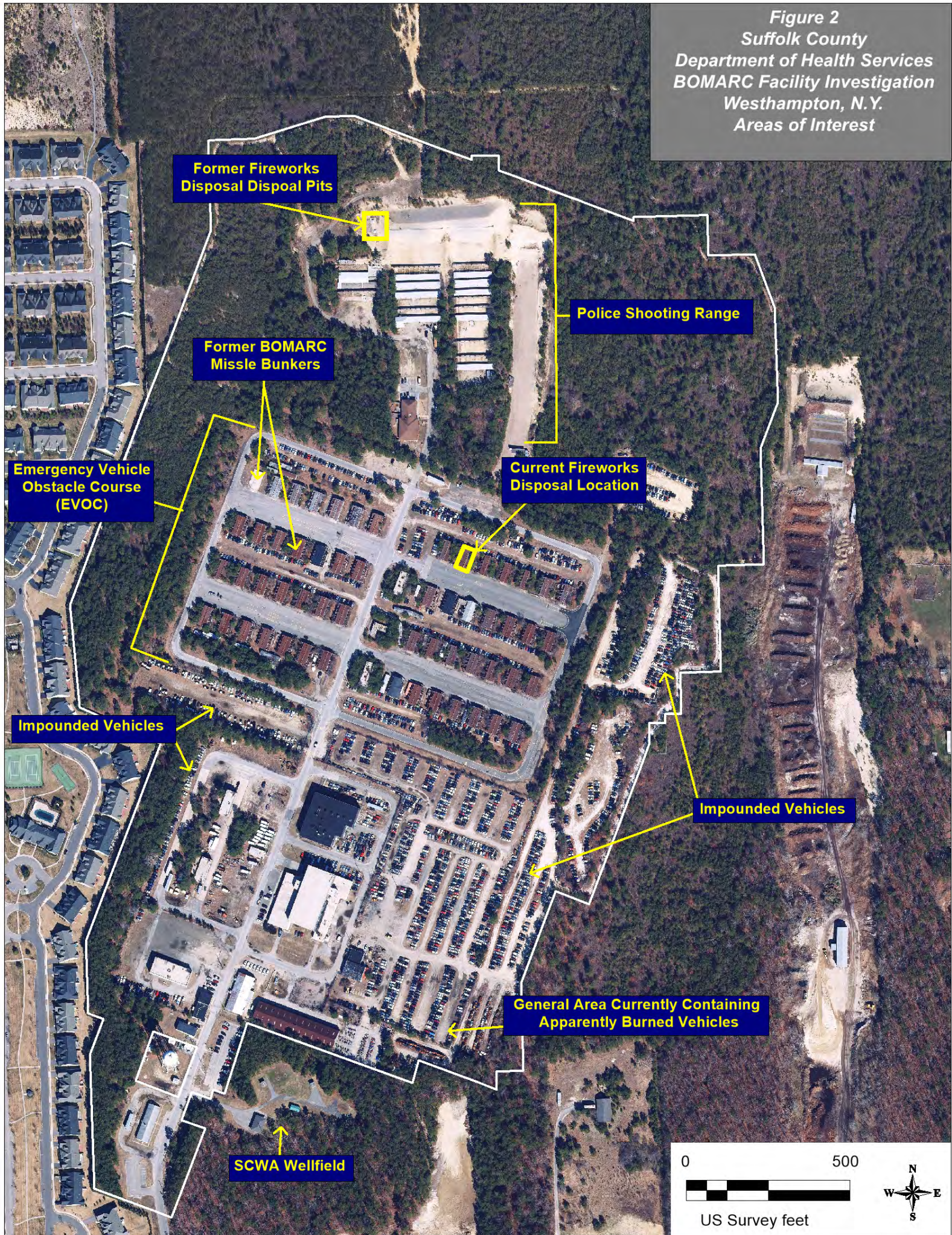
0 1,000



US Survey feet



Figure 2
Suffolk County
Department of Health Services
BOMARC Facility Investigation
Westhampton, N.Y.
Areas of Interest



Engineering recommendations were established to control rainwater from infiltrating the burning pits and contaminated liquids from exiting the pits. Removal and proper disposal of existing residue from the pits occurred in 1999.

- As of 2011, there were approximately 13 buildings located on the site. Many of the buildings use a site wide sanitary system although independent sanitary systems are also present. In general, based on past site use, the sanitary systems are considered potential areas of environmental concern.
- The site is primarily used by the SCPD for evidentiary vehicle storage. The storage of compromised vehicles on exposed surface soils poses potential environmental concerns.
- Also on the site are a power plant, pistol and rifle range, and emergency vehicle training area. The presence of a rifle/pistol range is considered a potential area of environmental concern due to residual lead from spent bullets.
- Interior floor drains have been identified in multiple buildings. These floor drains are potential areas of environmental concern based on past activities.
- 2012. Interior floor drain investigation, remediation and closure occurred for Building 205 on-site under the direction of OPC. Contaminants of concern included petroleum compounds, arsenic and chromium in soil.
- A total of 43 storage tanks have been registered with the County. Twelve of these tanks are still in use. Historical tank contents include fuel oil, gasoline, diesel, acid waste and jet fuel.
- A record review by the Office of Wastewater Management indicated that the file for the SCPD Rifle Range building, 905-305-1-1 (C09-97-0020 inactive), was to be microfilmed but was destroyed in error in 2016.

Interviews

Several persons with specialized knowledge of the site were interviewed by OPC during the October 2018 site inspection. Key personnel were able to provide insight into the heating systems formerly and currently in use, the storage of toxic and hazardous materials on site and the areas where such materials were located (e.g. Underground Storage Tanks for fuel oil). Information concerning the types of materials stored within the silos and the tenants occupying the silos was provided as needed. Information was shared by workers knowledgeable of the fireworks destruction areas and the former methods utilized to perform this task, including institution of the engineering controls put in place as a corrective action. These interviews were valuable in identifying areas for targeted soil and groundwater sampling.

Aerial Surveys

Aerial photo from 1947 shows no development on site and land is forested. A 1962 photo shows the site built-out with the larger building complex to the south and the smaller missile silos to the north. The photo also shows two strips of cleared forest oriented in a north/south direction: one that bisects the site and another to the east (Figure 1). A photo

from 1977-1978 shows cleared forest and development of the current shooting range; as well as the appearance of many stored automobiles around the site.

A 1984 aerial shows a clearing of woods with no development northeast of the missile silos. The SCPD building associated with the shooting range appears between the missile silos and the range on a 2001 aerial. The 2001 aerial also depicts the absence of the large round bulk oil storage tank.

Recognized Environmental Conditions

Asbestos-Containing Materials, Lead -Based Paint and Mold

Asbestos had been documented on-site and properly removed from several buildings. It is likely that Asbestos-Containing Materials (ACM) still exist on site; however, (OPC) records do not indicate which buildings or what materials may contain asbestos. The following summarizes asbestos related records that exist in OPC files.

Asbestos abatement was performed in the following years: 1988, 1989, 1991, 1993, 1996, and 1997. Abatement occurred in the following buildings: C- 203, 204, 207, 209, 215, 259, 261 and 264. Abatement consisted primarily of removal of asbestos containing pipe insulation. Ambient air sampling was performed by private contractors during these events and overseen by SCDPW and SCDHS.

In 1991, an asbestos survey for building C-200 was conducted by Anson Environmental. Nine samples were collected which showed negative results but the floor tiles were not sampled because “all floor tiles are assumed to contain asbestos.”

Potential asbestos containing floor tiles were identified in several of the buildings during the site inspection conducted by OPC in October 2018.

Potential lead based paint (LBP) on the wall and ceiling surfaces and piping were identified in several of the buildings during the site inspection conducted by OPC in October 2018.

Mold was noted by visual and olfactory identification in several buildings during the site inspection performed by OPC in October 2018.

Hazardous Material Storage (HMS)

The OPC hazardous materials storage database has 43 historic tank records for the BOMARC property. As of October 2018, the database indicates twelve active tanks on-

site, which were last inspected by OPC in 2017. Eight of these twelve tanks are 275-gallon aboveground storage tanks. One above ground storage tank (AST) containing heating oil, and one 275-gallon AST containing diesel fuel, are located indoors. In addition, three underground storage tanks (USTs) constructed of double wall fiberglass and ranging from 1,000 to 4,000 gallons in volume, are in use on-site.

The remaining 32 tanks were removed, although six tanks were removed without OPC oversight. Fourteen USTs were removed in 1989 and included four 10,000-gallon acid tanks, and ten jet fuel tanks ranging from 5,000-15,000 gallons in volume. A large 840,000-gallon steel AST used for the storage of fuel oil for the power plant existed on site from 1960-1996. The removal of this AST was not documented.

Some of the removed tanks, which were removed, have records indicating whether spillage was noted during removal. The tank removal reports noted no spills for tanks identified in the OPC tank database as numbers 1, 15, and 23. Respectively, these tank numbers represented a 15,000-gallon steel fuel oil UST, 12,000-gallon double wall fiberglass gasoline UST, and a 2,000-gallon steel waste oil UST.

In 1982, an OPC inspection revealed the improper storage of 55-gallon drums of pesticides in missile silos located in Buildings C-274 and 276. OPC files contained correspondence with the facility operator regarding modifying the silo to be compliant with sanitary code requirements because the facility intended to store numerous 55-gallon drums of pesticides. The pesticides (Telone II, Methyl Bromide, Vortex and Vapam) were stored by the US Department of Agriculture who leased the buildings for storage.

Spills and Reports of Site Contamination

This section provides a summary of reports, in chronological order, of spills or other evidence of contamination that may be related to the BOMARC site.

One on-site petroleum spill was reported to have occurred in 1983 when two 15,000 gallon steel fuel oil UST's were found to be leaking. Correspondence between SCDHS Office of Water Resources (OWR) and the SCDPW indicated the removal of the tanks as a first step towards the protection of groundwater.

In 1983, the first trace of a volatile organic compound was detected in the SCWA public drinking water supply well #2 located adjacent to the BOMARC site. The sample contained 6 ppb of trichloroethene. No further information regarding this matter was located in the record.

A search of the NYSDEC Spills database indicated a spill report number NY9313664 generated on February 21, 1994. The spill was due to “human error” as a result of a fill port for an out-of-service tank being broken by a snowplow and subsequently allowing rainwater to enter the fill port. The rainwater displaced petroleum contaminated water onto the ground surface requiring the remediation of surface soils. Subsequent to the remediation, the tank was abandoned in place and the spill was closed by NYSDEC on June 2, 1994.

In 1998, the SCWA advised the SCDHS that two public drinking water supply wells adjacent to the BOMARC site were contaminated with perchlorate. The SCPD maintains a fireworks disposal area on-site behind the gun firing range, upgradient of the public water wells. Groundwater data from a monitoring well placed adjacent to the fireworks burning pit identified the site as a point source of perchlorate contamination. In 1999, a remediation of the fireworks burn pit area (soil excavation of 8-10 yards) was overseen by OPC. In 2000, engineering control recommendations were established to control contaminated liquid discharged from the pits. In 2002, a protocol for the disposal of fireworks ash was developed by SCDHS. During the October 2018 site inspection, it was reported by SCDPW personnel that the fireworks are incinerated in an area other than the original burn pits. No record of this change of location for the current fireworks disposal area exists in OPC files. A subsequent site visit in October 2018 revealed that the new burn pit area consists of two metal explosion-proof boxes that were placed inside of a former missile silo building (Building C-265). Interviews with SCPD, the sole users of the burn pits, provided updated information regarding the current disposal procedures. To the recollection of present staff, the original burn pits were last known to be used as of 12/31/12. As of March 2016, the “burn boxes”, consisting of 30,000 pounds of steel, were installed in Bunker 265. The burning of ordinance and explosive materials occurs infrequently. As such, residue from all materials that have been incinerated since 2016 has remained in either the burn box or the detonation bunker. Debris in the bunker consists mostly of incinerated paper and cardboard from the firework casings. Material within the burn box is primarily ash. No disposal of waste material from the incineration process has occurred since this method has been in place.

P.W. Grosser performed a Limited Phase II report dated January 30, 2014 on behalf of SCDPW. The report identified soils contaminated with VOCs (BTEX), SVOCs, arsenic, lead and chromium within the sanitary system and interior floor drains. Fenley & Nicol completed the remediation of the sanitary systems site-wide and interior floor drains under the direction of OPC.

Underground Injection Control Systems (UICs)

An Underground Injection Control System (UIC) (a USEPA designation for injection wells deeper than its surface width) is a term used to designate on-site underground disposal systems such as sanitary systems, storm drains, and industrial discharges. These are sometimes connected to interior floor drains or exterior catch basins.

Records in the OPC hazardous materials storage database depict several UIC systems on-site. Blueprint plans from the Air Force dated 1962 show several independent UIC systems. One septic tank (ST) and leaching pool (LP) is shown in the middle of the grid of the missile silo buildings, between building C-219 and C-218, with effluent piping shown exiting from building C-219. Power plant building C-215 is shown to have a basement drain leading to an oil/water separator; however, the final discharge point is not shown. Buildings C-200 and C-207 appear to have independent sanitary leaching pools.

The blueprint shows the site-wide shared sanitary system south of buildings C-202 and 204 and west of the water tower, and consists of four leaching pools. Hazardous material storage locations adjacent to buildings C-206, C-216, and C-210 are shown to have two UIC systems designed to manage spills. These two systems consist of pits assumed to be cement with associated leaching pools.

A site map from 2012 by P.W. Grosser depicts several UIC features such as septic tanks, cesspools, storm drains, water drains, floor drains, and a structure referred to as an abandoned 'motor vehicle disposal well.' The main site-wide shared sanitary system appears identical to that depicted on the 1962 plans with the leaching pools shown west of the water tower. The police building at the shooting range is shown to have an independent septic tank and leaching pools. Building C-200 is shown to have an independent cesspool. An 'industrial drainage well' (per P.W. Grosser) is shown associated with building C-215. Several storm drains are shown at the shooting range area, near building C-561, and near the southwest corner of building C-209.

Site Inspection Results

OPC staff performed a site inspection in October 2018. Findings are described below.

- **Military /Enforcement Use of the Property:** The subject property has been in use as a government facility, for military and law enforcement, for approximately six decades. Past military practices included disposal of hazardous materials, including gasoline, diesel, motor oil, products containing petroleum, solvents, lead-containing batteries and paints, and various other chemicals. The use by law enforcement personnel has included the destruction of fireworks containing perchlorate.

- The BOMARC missile site is associated with the storage of Surface-to-Air Missiles (SAMs) containing nuclear warheads. The historic presence of a military base on the subject property and current use for law enforcement purposes represents a possible source of contamination to the local soils and groundwater.
- **Surface Staining:** Large and small isolated areas of black staining were observed on the asphalt, concrete and soil surfaces throughout the developed areas of the subject property. Much of the staining appears to be due to the storage and staging of vehicles in these areas. Apparently, the vehicles stored are for evidentiary purposes resulting from theft and most often collisions. If not properly contained, any automotive liquids released to the ground surface can enter surrounding soils or storm water drainage structures through storm water runoff. Approximately one dozen storm water drains were observed on site. These structures, also classified as Underground Injection Controls (UICs) are often a source of contamination from surface discharges.
- **Underground Injection Controls (UICs):** These areas of concern include on-site sanitary and storm-water leaching systems, and interior floor drains. Based upon recent site inspection and the review of department records there are believed to be an estimated 2-3 dozen sanitary, storm drain and interior floor drain UICs present. Additional subsurface overflow pools may also exist.
- **In-Ground Hydraulic Lifts:** The subject site has a building containing in-ground hydraulic lift(s) within the garage/bay area. The equipment associated with the lift(s) appears to be old and possibly installed at the time of the construction of the building; circa 1950's. Subsurface soils and groundwater may have been affected by petroleum products leaking from the in-ground hydraulic lift(s).
- **Potential Asbestos-Containing Material(ACM):** The original age of the buildings on the subject site (1950's) indicates that potential-ACM may be present in both exposed and unexposed building construction materials and components, particularly in older, un-renovated portions of the buildings.
- **Potential Lead-Based Paint (LBP):** Based on the age of the buildings on the subject site, (1950's), the potential exists for the presence of lead paint in the under layers of paint throughout older, un-renovated portions of the buildings. Both the exterior and interior of the buildings may contain LBP.
- **Mold:** Based on the age of the subject buildings (1950's) and the dilapidated condition, including flooding of several structures, the presence of mold in several structures was noted and may be present in others.
- **Polychlorinated biphenyls (PCBs):** Since the original age of the buildings on the subject property (1950's) pre-dates the federal ban on the manufacture of PCBs in the 1970's, it is possible that any older hydraulic and/or electrical equipment (e.g. fluorescent light ballasts) and other building materials (e.g. caulking, ceiling tiles, adhesives) within older, un-renovated portions of the buildings have PCB-containing components. There is at least one known building on site with hydraulic lifts.
- **Petroleum Storage Tanks:** Active and removed aboveground storage tanks (ASTs) and underground storage tanks (USTs) were identified throughout the subject site. The potential for leaking tanks, spills and overfilling exists with these tanks. Considering the many decades of site operation and the storage of petroleum products on site during this

time, subsurface soils and groundwater may have been affected by products leaking from these tanks.

- **Shooting Range:** Shooting ranges typically have lead in surface soils from the spent bullets. Since this site has had a shooting range for many years, there is a potential for lead to be found in the soil.
- **Burn Pits for Destruction of Fireworks:** Fireworks are known to contain perchlorate. Perchlorate has been identified as a contaminant at this site during a previous groundwater investigation. Due to the destruction of fireworks at this site until 2012, and the potential for the discharge of “waste ash” from the destruction of fireworks, both soil and groundwater may be contaminated.
- **Detonation Bunker for Fireworks:** Fireworks incineration occurring in this location has the potential of creating ash debris. The ash has the potential to contain contaminants that may adversely impact both the nearby soil and groundwater.

Soil Sample Collection Event

A total of 25 soil samples were collected from various environmental points of interest. “Grab” samples (discrete samples) were collected from the surface and each UIC structure. A composite sample (mixed from several locations) was collected from a grouping of four storm water drywells (sample S-9). All samples were analyzed for volatile (VOC), semi-volatile organic compounds (SVOC) and heavy metals. Some of the samples were analyzed for PCB’s, pesticides and radiological. Samples were preserved with ice and transported with proper chain-of-custody to the Suffolk County Public Environmental Health Lab (PEHL). Refer to Figure 3a and 3b for all subsurface UIC and surface soil sample locations and Appendix B for photo documentation.

Subsurface soil results were compared to the County Standard Operating Procedure (SOP) No.9-95 “Pumpout and Soil Cleanup Criteria”. SOP No.9-95 contains action levels and cleanup objectives for UICs with respect to VOCs, SVOCs and heavy metals. When the concentration of a contaminant in a UIC equals or exceeds the “Action Level”, a remediation of the impacted structure is required. Remaining soil must be below the contaminant’s “Cleanup Objective” or additional remediation will typically be required.

SOP 9-95 cleanup standards were developed primarily for subsurface discharges and only consider impact on groundwater resources. Direct contact was not considered in the development of these standards so SOP 9-95 is not typically used for analysis of surface soil samples. Surface soil results were compared to the Soil Cleanup Objectives found in 6NYCRR Part 375 (see Appendix C).

The soil-sampling event was limited in nature and targeted toward areas of potential contamination identified during the records review and site inspection. Only those UIC

structures that were accessible were sampled. Overflow leaching pools associated with interior floor drains, sanitary systems and storm-water drains that were not accessible may also exist and require additional investigation.

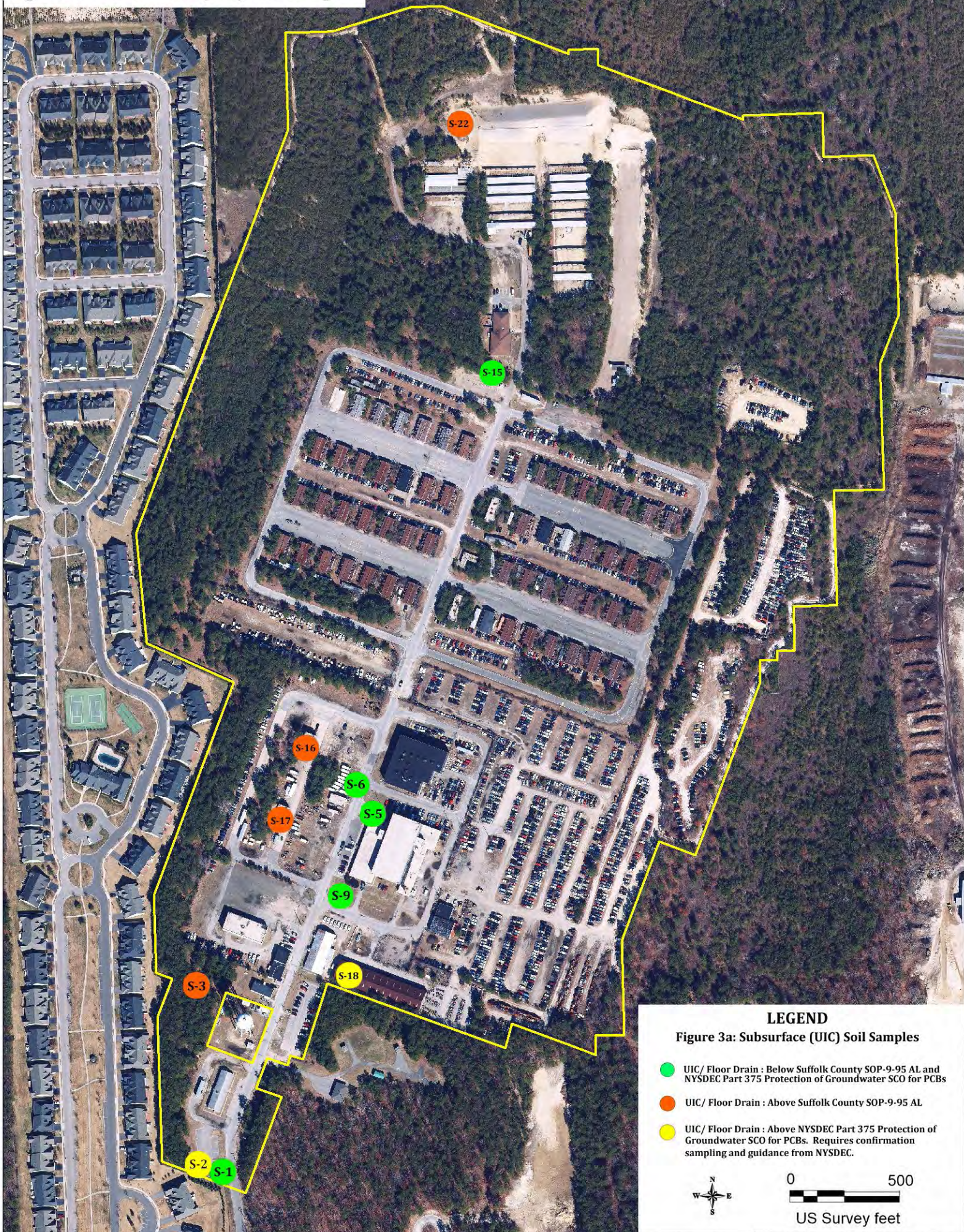
Subsurface UIC Soil Sample Results

Table 1, below, summarizes a comparison of each UIC sample to SCDHS SOP No.9-95. Results are shown as “BELOW” or “EXCEEDED”, with respect to their regulatory guidelines. A “BELOW” value indicates that no exceedance of an action level was detected. “EXCEEDED,” means one or more compounds were present over their respective action level, and a remediation of the structure would be required. Four of eleven UIC structures sampled had concentrations of VOCs, SVOCs and/or metals that exceeded Suffolk County standard SOP 9-95. There are no standards for PCBs in SOP 9-95. For UICs, PCB results were compared to the NYSDEC Part 375 “Protection of Groundwater” Soil Cleanup Objective (SCO). Samples from floor drains located in building CO206 and CO216 exceeded the SCO by several orders of magnitude (9,560,000 parts per billion (ppb) and 449,000 ppb, respectively, compared to the groundwater protection SCO of 3,200 ppb). Figure 3a provides subsurface soil sample locations and comparison to these standards.

Sample ID	UIC Description, Location	Suffolk County SOP-9-95			Part 375	Disposition
		VOCs	SVOCs	Metals	PCBs	
S-1	storm-water drywell, south parking lot	BELOW	BELOW	BELOW	BELOW	No remediation based upon SOP-9-95
S-2	storm-water drywell, south parking lot	BELOW	BELOW	BELOW	EXCEEDED	No remediation based upon SOP-9-95
S-3	sanitary septic tank, south wooded area	EXCEEDED	BELOW	BELOW	N/A	Remediation required
S-5	storm-water drywell, bldg C0209	BELOW	BELOW	BELOW	N/A	No remediation based upon SOP-9-95
S-6	storm-water drywell, bldg C0209	BELOW	BELOW	BELOW	N/A	No remediation based upon SOP-9-95
S-9	storm-water drywell composite, grass area	BELOW	BELOW	BELOW	N/A	No remediation based upon SOP-9-95
S-15	cesspool, firing range bldg C0960	BELOW	BELOW	BELOW	N/A	No remediation based upon SOP-9-95
S-16	floor drain, bldg C0216	EXCEEDED	EXCEEDED	EXCEEDED	EXCEEDED	Remediation required
S-17	floor drain, bldg C0206	BELOW	EXCEEDED	EXCEEDED	EXCEEDED	Remediation required
S-18	floor drain, bldg C0205	BELOW	BELOW	BELOW	EXCEEDED	No remediation based upon SOP-9-95
S-22	former fireworks burn pit	EXCEEDED	BELOW	EXCEEDED	EXCEEDED	Remediation required
BELOW = No values detected over SOP-9-95 action levels OR Part 375 Protection of Groundwater						
EXCEEDED = Values detected over SOP-9-95 action levels OR Part 375 Protection of Groundwater						
N/A = Not analyzed						

Principal contaminants found in the UIC samples above SOP-9-95 cleanup criteria include benzene, xylene, chrysene, trimethylbenzene, methyl ethyl ketone, cadmium, chromium, barium, copper and lead.

Figure 3a: Subsurface (UIC) Soil Samples



Surface Soil Sample Results

Table 2, below, summarizes results of surface soil samples to NYSDEC Part 375. The “Unrestricted Use” SCO was used as a baseline. Please refer to Table 4 for the pesticide surface soil results. A “BELOW” value indicates all parameters meet the Unrestricted Use SCO. “EXCEEDED” means one or more parameters exceed the Unrestricted SCO. In instances where the “Unrestricted Use” SCO was exceeded, the Part 375 restricted land use that was met is indicated in the “Comment” column of Table 2 as a measure of the degree of contamination. It should be noted that the Unrestricted Use SCO was used for comparison purposes only and does not necessarily indicate that remediation is required. This initial comparison does not take into account current site use and does not reflect an evaluation of potential exposures to workers on-site.

Figure 3b depicts surface soil locations above an Unrestricted Use SCO. While it is unknown at this time which SCOs will be appropriate for determining remedial actions, Protection of Groundwater SCOs typically apply to all sites in Suffolk County. Commercial Use SCOs may be reflective of current use. Therefore, surface soil samples that exceeded Protection of Groundwater SCOs or Commercial Use SCO are also shown on Figure 3b.

It should be noted that the sample sites selected were targeted as areas of potential contamination and are not representative of the entire site. Of these six elevated samples, one was an ash sample from the new fireworks burn box, three were soil samples from the shooting range, one was from stained soil adjacent to an aboveground tank, and one was from soil adjacent to a concrete pad suspected of previous hazardous material storage. Elevated concentrations of contaminants in these samples could be expected.

Further investigation and evaluation will be required in order to determine appropriate remedial actions. This will be determined with guidance from New York State Department of Health (NYSDOH) and after consultation with NYSDEC.

Metals, principally lead, were elevated in surface soils at the firing range. This is not unusual and occurs as a function of the normal operation of the range. Therefore, these soils are not considered hazardous waste as long as the range remains active. Suffolk County Police Officers on-site take precautions to limit exposure to shooting range dust and are routinely monitoring for blood lead levels.

Principal contaminants found in the surface soil samples above Part 375 cleanup criteria include PCBs, lead, xylene, chrysene, barium and arsenic.

Figure 3b: Surface Soil Samples

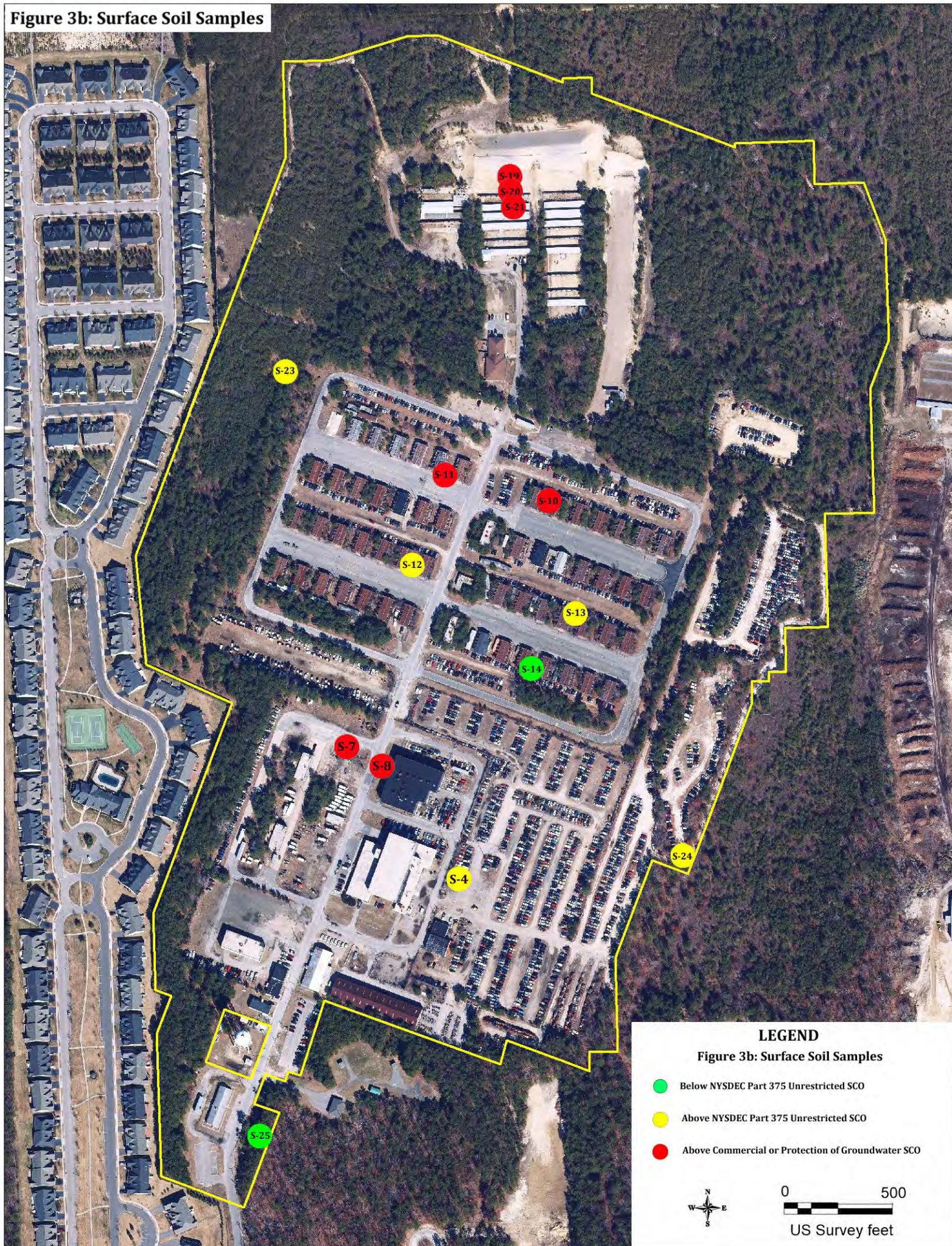


Table 2: Sampling Summary, Surface Soils, VOCs, SVOCs, Heavy Metals, PCBs

Sample ID	Surface Sample Description, Location	Part 375 Unrestricted				Comment
		VOCs	SVOCs	Metals	PCBs	
S-4	surface sample, gasoline storage area	BELOW	BELOW	EXCEEDED	BELOW	Meets Part 375 Residential
S-7	surface sample, bldg C0210	EXCEEDED	BELOW	EXCEEDED	EXCEEDED	Meets Part 375 Industrial
S-8	surface sample, bldg C0215	BELOW	EXCEEDED	BELOW	EXCEEDED	SVOCs Exceed all PART 375 standards
S-10	fireworks burn box, silo 265	BELOW	BELOW	EXCEEDED	N/A	Meets Part 375 Industrial
S-11	surface sample, s/w corner of silo 261	BELOW	EXCEEDED	EXCEEDED	EXCEEDED	Meets Part 375 Restricted Res.
S-12	surface sample, between silos 231 & 233	BELOW	BELOW	BELOW	EXCEEDED	Meets Part 375 for Residential
S-13	surface sample, between silos 243 & 245	BELOW	BELOW	BELOW	EXCEEDED	Meets Part 375 for Residential
S-14	surface sample, s/w corner of silo 242	BELOW	BELOW	BELOW	BELOW	Meets Part 375 for Unrestricted
S-19	surface, firing range-front wall	BELOW	BELOW	EXCEEDED	EXCEEDED	Metals Exceed all PART 375 standards
S-20	surface, firing range-ground	BELOW	BELOW	EXCEEDED	EXCEEDED	Meets Part 375 Industrial
S-21	surface, firing range-rear collection point	BELOW	BELOW	EXCEEDED	EXCEEDED	Meets Part 375 Industrial
S-23	surface, west point	BELOW	BELOW	BELOW	N/A	Meets Part 375 for Unrestricted
S-24	surface, east point	BELOW	BELOW	BELOW	N/A	Meets Part 375 for Unrestricted
S-25	surface, south point	BELOW	BELOW	BELOW	N/A	Meets Part 375 for Unrestricted

BELOW = All analyte concentrations are below PART 375 standards for UNRESTRICTED USE

EXCEEDED = Analyte concentrations are present above PART 375 standards for UNRESTRICTED USE

N/A = Not analyzed.

Heavy metals analyses for surface soil samples have been adjusted to “dry weight” in order to compare to Part 375 values. This data is included in Appendix D.

- Supplemental PCB Surface Soil Sampling

Based upon review of the initial PCB data resulting from the April/May 2019 testing, SCDHS determined additional investigation was warranted due to the presence of PCBs in surface soils. These samples were collected in December 2019.

The sampling scope primarily focused on further evaluation of the firing ranges and an area south of the firing range where automobiles were being stored. Seventy samples were obtained from two grids in these areas, and were only analyzed for the presence of PCBs. Three of the seventy samples were obtained at a deeper interval (6-8 inches from surface). Refer to the site figures below for all grid sample locations.



PCB concentrations were generally low or non-detect within the surface grids. The PCB levels detected in the pistol range were significantly lower than those found in the samples taken in the April/May 2019 testing. Results from the initial and supplemental soil sampling are summarized in Table 3, below. The sample IDs have the prefix “S” for the initial sampling round and “SS” for the supplemental sampling round. All positive detections are in red. Analytical laboratory reports for this supplemental sampling effort are included in Appendix E.

Table 3 –PCB Surface Soil and UIC Sampling Results

Sample ID	Date Collected	Sample Location	Sample Type	PCBs, parts per billion							PCB, Total
				Aroclor-1016	Aroclor-1221	Aroclor-1232	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260	
S1	4/30/2019	south parking lot	storm drain, UIC	<44.8	<91.0	<44.8	<44.8	<44.8	49.1	<44.8	49.1
S2	4/30/2019	south parking lot	storm drain, UIC	<683	<1390	<683	<683	<683	4300	<683	4300
S4	4/30/2019	gas storage area	surface soil	<37.7	<76.6	<37.7	<37.7	<37.7	<37.7	<37.7	<76.6
S7	4/30/2019	parking lot, bldg C0210	surface soil	<765	<1550	<765	<765	<765	6310	<765	6310
S8	4/30/2019	concrete pad, bldg C0215	surface soil	<36.2	<73.4	<36.2	125	<36.2	193	105	317
S11	4/30/2019	silo 261	surface soil	<44.5	<90.4	<44.5	<44.5	<44.5	433	<44.5	433
S12	4/30/2019	silo 231/233	surface soil	<35.9	<72.8	<35.9	<35.9	<35.9	337	<35.9	337
S13	4/30/2019	silo 243/245	surface soil	<38.3	<77.8	<38.3	<38.3	<38.3	168	<38.3	168
S14	4/30/2019	silo 242	surface soil	<35.9	<72.9	<35.9	<35.9	<35.9	<35.9	<35.9	<72.9
S16	5/1/2019	bldg C0216, floor drain	soil, UIC	<41400	<84100	<41400	<41400	<41400	449000	<41400	449000
S17	5/1/2019	bldg, C0206 floor drain	soil, UIC	<1200000	<2440000	<1200000	<1200000	<1200000	9560000	<1200000	9560000
S18	5/1/2019	bldg C0205, floor drain	soil, UIC	<3440	<6990	<3440	<3440	<3440	7110	<3440	7110
S19	5/1/2019	firing range, front wall	surface sand	<1730	<3510	<1730	<1730	<1730	10900	<1730	10900
S20	5/1/2019	firing range, ground	surface sand	<1730	<3520	<1730	<1730	<1730	10500	<1730	10500
S21	5/1/2019	firing range, rear	surface soil	<699	<1420	<699	<699	<699	5640	<699	5640
S22	5/1/2019	former firewoks burn pit	sludge	<871	<1770	<871	<871	<871	6070	<871	6070
SS1	12/30/2019	Hogans Alley	surface soil	<33.3	<67.5	<33.3	<33.3	<33.3	<33.3	<33.3	<67.5
SS2	12/30/2019	Hogans Alley	surface soil	<32.8	<66.5	<32.8	<32.8	<32.8	<32.8	<32.8	<66.5
SS3	12/30/2019	firing range	surface soil	<35.6	<72.3	<35.6	<35.6	<35.6	<35.6	<35.6	<72.3
SS4	12/30/2019	firing range	surface soil	<36.4	<73.8	<36.4	<36.4	<36.4	<36.4	<36.4	<73.8
SS5	12/30/2019	rifle range	surface soil	<35.6	<72.2	<35.6	<35.6	<35.6	<35.6	<35.6	<72.2
SS6	12/30/2019	rifle range	surface soil	<36.9	<74.9	<36.9	<36.9	<36.9	<36.9	<36.9	<74.9
SS7	12/30/2019	rifle range	surface soil	<36.6	74.3	<36.6	<36.6	<36.6	<36.6	<36.6	74.3
SS8	12/30/2019	rifle range	surface soil	<39.7	<80.6	<39.7	<39.7	<39.7	<39.7	<39.7	<80.6
SS9	12/30/2019	rifle range	surface soil	<37.5	<76.1	<37.5	<37.5	<37.5	<37.5	<37.5	<76.1
SS10	12/30/2019	sniper range	surface soil	<36.9	<75.0	<36.9	<36.9	<36.9	<36.9	<36.9	<75.0
SS11	12/30/2019	sniper range	surface soil	<38.2	<77.7	<38.2	<38.2	<38.2	<38.2	<38.2	<77.7
SS12	12/31/2019	sniper range	surface soil	<37.5	<76.2	<37.5	<37.5	<37.5	50.2	<37.5	50.2
SS13	12/31/2019	sniper range	surface soil	<37.9	<77.0	<37.9	<37.9	<37.9	49.7	<37.9	49.7
SS14	12/31/2019	sniper range	surface soil	<35.4	<71.9	<35.4	<35.4	534	<35.4	<35.4	534
SS15	12/31/2019	sniper range	surface soil	<36.9	<74.9	<36.9	<36.9	<36.9	55.4	<36.9	55.4
SS16	12/31/2019	sniper range	surface soil	<36.6	<74.3	<36.6	<36.6	<36.6	<36.6	<36.6	<74.3
SS17	12/31/2019	sniper range	surface soil	<36.2	<73.4	<36.2	<36.2	<36.2	40.2	<36.2	40.2
SS18	12/31/2019	sniper range	surface soil	<36.2	<73.5	<36.2	<36.2	<36.2	<36.2	<36.2	<73.5
SS19	12/31/2019	sniper range	surface soil	<37.7	<76.5	<37.7	<37.7	<37.7	41.9	<37.7	41.9
SS20	12/31/2019	firing range	surface soil	<34.8	<70.6	<34.8	<34.8	<34.8	<34.8	<34.8	<70.6
SS21	12/31/2019	firing range	surface soil	<34.9	<70.8	<34.9	<34.9	<34.9	<34.9	<34.9	<70.8
SS22	12/31/2019	firing range	surface soil	<34.8	<70.7	<34.8	<34.8	<34.8	<34.8	<34.8	<70.7
SS23	12/31/2019	firing range	surface soil	<34.8	<70.7	<34.8	<34.8	<34.8	<34.8	<34.8	<70.7
SS24	12/31/2019	firing range	surface soil	<35.0	<71.0	<35.0	<35.0	<35.0	<35.0	<35.0	<71.0
SS25	12/31/2019	firing range	surface soil	<34.8	<70.7	<34.8	<34.8	<34.8	<34.8	<34.8	<70.7
SS26	12/31/2019	firing range	surface soil	<35.0	<71.0	<35.0	<35.0	<35.0	<35.0	<35.0	<71.0
SS27	12/31/2019	firing range	surface soil	<35.0	<71.0	<35.0	<35.0	<35.0	<35.0	<35.0	<71.0
SS28	12/31/2019	firing range	surface soil	<34.2	<69.3	<34.2	<34.2	<34.2	<34.2	<34.2	<69.3
SS29	12/31/2019	firing range (repeat from 5/1/19)	surface soil	<34.5	<70.0	<34.5	<34.5	<34.5	<34.5	<34.5	<70.0
SS29B	12/31/2019	firing range (2nd depth)	surface soil	<33.7	<68.3	<33.7	<33.7	<33.7	<33.7	<33.7	<68.3
SS30	12/31/2019	firing range	surface soil	<34.8	<70.7	<34.8	<34.8	<34.8	<34.8	<34.8	<70.7
SS31	12/31/2019	firing range	surface soil	<34.7	<70.4	<34.7	<34.7	<34.7	<34.7	<34.7	<70.4
SS32	12/31/2019	firing range	surface soil	<34.8	<70.6	<34.8	<34.8	<34.8	<34.8	<34.8	<70.6
SS33	12/31/2019	firing range	surface soil	<34.3	<69.6	<34.3	<34.3	<34.3	<34.3	<34.3	<69.6
SS34	12/31/2019	firing range	surface soil	<36.2	<73.5	<36.2	<36.2	<36.2	<36.2	<36.2	<73.5
SS35	12/31/2019	firing range	surface soil	<34.4	<69.7	<34.4	<34.4	<34.4	<34.4	<34.4	<69.7
SS36	12/31/2019	rifle range	surface soil	<34.1	<69.3	<34.1	<34.1	<34.1	<34.1	<34.1	<69.3
SS37	12/31/2019	rifle range	surface soil	<34.8	<70.6	<34.8	<34.8	<34.8	<34.8	<34.8	<70.6
SS38	12/31/2019	rifle range	surface soil	<34.6	<70.3	<34.6	<34.6	<34.6	<34.6	<34.6	<70.3
SS39	12/31/2019	rifle range	surface soil	<35.5	<72.0	<35.5	<35.5	<35.5	<35.5	<35.5	<72.0
SS40	12/31/2019	rifle range	surface soil	<36.0	<73.1	<36.0	<36.0	<36.0	<36.0	<36.0	<73.1
SS41	12/31/2019	rifle range	surface soil	<36.0	<73.2	<36.0	<36.0	<36.0	<36.0	<36.0	<73.2
SS42	12/31/2019	rifle range	surface soil	<34.5	<70.0	<34.5	<34.5	<34.5	<34.5	<34.5	<70.0
SS43	12/31/2019	rifle range (repeat from 5/1/19)	surface soil	<33.8	<68.7	<33.8	<33.8	<33.8	<33.8	<33.8	<68.7
SS43B	12/31/2019	rifle range (2nd depth)	surface soil	<34.6	<70.2	<34.6	<34.6	<34.6	<34.6	<34.6	<70.2
SS44	12/31/2019	rifle range	surface soil	<34.3	<69.6	<34.3	<34.3	<34.3	<34.3	<34.3	<69.6
SS45	12/31/2019	rifle range	surface soil	<34.4	<69.8	<34.4	<34.4	<34.4	<34.4	<34.4	<69.8
SS46	12/31/2019	rifle range	surface soil	<34.7	<70.4	<34.7	<34.7	<34.7	<34.7	<34.7	<70.4
SS47	12/31/2019	rifle range	surface soil	<33.4	<67.8	<33.4	<33.4	<33.4	<33.4	<33.4	<67.8
SS48	12/31/2019	firing range	surface soil	<33.3	<67.7	<33.3	<33.3	<33.3	<33.3	<33.3	<67.7
SS49	12/31/2019	firing range	surface soil	<34.0	<68.9	<34.0	<34.0	<34.0	<34.0	<34.0	<68.9
SS50	12/31/2019	firing range	surface soil	<33.4	<67.7	<33.4	<33.4	<33.4	<33.4	<33.4	<67.7
SS51	12/31/2019	auto storage	surface soil	<39.6	<80.4	<39.6	<39.6	<39.6	<39.6	<39.6	<80.4
SS52	12/31/2019	auto storage	surface soil	<36.1	<73.3	<36.1	<36.1	<36.1	57.6	<36.1	57.6
SS53	12/31/2019	auto storage	surface soil	<34.1	<69.3	<34.1	<34.1	<34.1	<34.1	<34.1	<69.3
SS54	12/31/2019	auto storage	surface soil	<37.8	<76.7	<37.8	<37.8	<37.8	45.0	<37.8	45.0
SS55	12/31/2019	auto storage	surface soil	<38.3	<77.7	<38.3	<38.3	<38.3	232	<38.3	232
SS56	12/31/2019	auto storage	surface soil	<39.6	<80.4	<39.6	<39.6	<39.6	56.6	<39.6	56.6
SS57	12/31/2019	auto storage	surface soil	<35.4	<71.9	<35.4	<35.4	<35.4	<35.4	<35.4	<71.9
SS58	12/31/2019	auto storage	surface soil	<41.3	<83.8	<41.3	<41.3	<41.3	<41.3	<41.3	<83.8
SS59	12/31/2019	auto storage	surface soil	<36.6	<74.4	<36.6	<36.6	<36.6	<36.6	<36.6	<74.4
SS60	12/31/2019	auto storage	surface soil	<37.5	<76.1	<37.5	<37.5	<37.5	<37.5	<37.5	<76.1
SS61	12/31/2019	auto storage	surface soil	<37.2	<75.5	<37.2	<37.2	<37.2	<37.2	<37.2	<75.5
SS62	12/31/2019	auto storage	surface soil	<37.7	<76.6	<37.7	<37.7	<37.7	<37.7	<37.7	<76.6
SS63	12/31/2019	auto storage	surface soil	<35.8	<72.6	<35.8	<35.8	<35.8	102	<35.8	102
SS64	12/31/2019	auto storage	surface soil	<36.8	<74.6	<36.8	<36.8	<36.8	164	<36.8	164
SS65	12/31/2019	auto storage	surface soil	<41.2	<83.7	<41.2	<41.2	<41.2	41.5	<41.2	41.5
SS65B	12/31/2019	auto storage (2nd depth)	surface soil	<35.8	<72.7	<35.8	<35.8	<35.8	<35.8	<35.8	<72.7
SS66	12/31/2019	bldg C0206 rear	surface soil	<43.4	<88.0	<43.4	<43.4	<43.4	<43.4	<43.4	<88.0
SS67	12/31/2019	bldg C0216 rear	surface soil	<387	<785	<387	<387	<387	2360	<387	2360

Pesticide and Radiological Analysis of Surface Soil

Due to historic use of the property, pesticides and radiological samples were also obtained from random locations throughout the site. Pesticide data were compared to NYSDEC Part 375 SCOs. Pesticide results are shown in Table 4, below. Sample locations with SCO exceedances are reflected in Figure 3b.

Table 4 - Pesticide Surface Sample Results

Pesticide	Unrestricted SCO (ppb)	Sample Results (ppb)						
		S-11	S-12	S-13	S-14	S-23	S-24	S-25
Aldrin	5	12.9	N/D	N/D	N/D	N/D	N/D	N/D
alpha-BHC	20	18	N/D	N/D	N/D	N/D	N/D	N/D
beta-BHC	36	31.1	N/D	N/D	N/D	N/D	N/D	N/D
delta-BHC	40	2.4	N/D	N/D	N/D	N/D	N/D	N/D
Lindane	100	28	N/D	N/D	N/D	N/D	N/D	N/D
Chlordane	94	N/D	N/D	N/D	N/D	N/D	N/D	N/D
4,4-DDD	3.3	38.4	N/D	N/D	N/D	N/D	N/D	N/D
4,4-DDE	3.3	183	13.6	N/D	N/D	N/D	N/D	N/D
4,4-DDT	3.3	200	9	5.2	N/D	N/D	5.3	N/D
Dieldrin	5	N/D	N/D	N/D	N/D	19.3	N/D	N/D
Endosulfan I	2,400	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Endosulfan II	2,400	N/D	N/D	N/D	N/D	20.7	N/D	N/D
Endosulfan Sulfate	2,400	295	N/D	N/D	N/D	N/D	N/D	N/D
Endrin	14	38.8	N/D	N/D	N/D	17.4	N/D	N/D
Heptachlor	42	7.8	N/D	N/D	N/D	N/D	N/D	N/D

Note: N/D indicates "Not Detected"

Analytical data for radiological parameters are included in Appendix E. All radiological detections in soil were consistent with background concentrations.

Groundwater Investigation

Groundwater Well Construction

As part of a preliminary groundwater investigation of the former BOMARC facility, in 2019 the SCDHS Office of Water Resources installed 28 temporary profile wells. Twenty-five of the temporary profile wells were installed using a Geoprobe percussion drill rig. All twenty-five temporary profile wells were installed using virgin schedule 40 flush fit PVC pipe in five-foot lengths with a flush fit schedule 40 five foot 0.010 slot screen and finished with a well point. The one-inch temporary profile wells were installed from seventy to

ninety feet below grade (fbg). Three of the temporary profile wells were installed to a depth of one hundred fifty feet bgs using a CME-55 hollow stem auger rig. These augered wells were installed with virgin two-inch diameter schedule 80 flush fit casing in ten-foot lengths. A two-inch diameter flush fit schedule 80 five foot 0.010 slot screen, with a two inch diameter flush fit schedule 80 five foot sump with a well point, was installed at the bottom of each of the three wells. All wells were capped with a J-plug and a rain tight manhole cover was placed over the casings to further protect the wells.

Groundwater Sampling Technique and Sample Analyses

Each of the temporary profile wells were initially sampled at the deepest level and then pulled up ten feet and sampled again. This process was repeated until the top of the water table was reached. This procedure resulted in the collection of five to seven samples in each of the twenty-five one inch temporary profile wells and eleven to twelve samples from each of the three two-inch diameter temporary profile wells. This method produces an analytical profile of the groundwater from the top of the water table down to the depth at which the wells were drilled.

High density polyethylene (HDPE) tubing was used with a Waterra Hydrolift portable actuator with a stainless steel inertial pump (foot valve) attached to extract groundwater from the wells. The wells were purged a minimum of three well casing volumes. Samples were not collected until field parameters were stabilized and the turbidity was ≤ 50 NTU. Field parameters recorded included temperature, dissolved oxygen, conductivity, oxidation-reduction potential (ORP), and pH. Samples were collected by SCDHS Office of Water Resources public health sanitarians and analyzed by the SCDHS - Public and Environmental Health Laboratory (PEHL) for nutrients, volatile organic compounds, semi-volatile organic compounds, metals, pesticides, and radiation. Per- and polyfluoroalkyl substance (PFAS) samples were analyzed by Eurofins Test America. Perchlorate samples were analyzed by Pace Analytical. Table 5 summarizes groundwater sample analytical methods.

Nutrients

Groundwater samples were analyzed by the PEHL in accordance with “Standard Operating Procedure for Sampling for Inorganic Compounds in Aqueous Samples” (US EPA, 2002). The samples were stored on ice at 4° C and transported to the PEHL for analysis utilizing US EPA method 350.1 for Ammonia; US EPA method 300.1 for Nitrates; US EPA method 353.2/354.1 for Nitrites; and US EPA method 300.0 for Chlorides.

Volatile Organic Compounds

Groundwater samples were analyzed for Volatile Organic Compounds by the PEHL in accordance with “Standard Operating Procedure for Head Space Screening for Volatile Organic Compounds in Aqueous Samples” (US EPA, 2002). The samples were stored on ice

at 4° C and transported to the PEHL for analysis using US EPA method 524.2 (US EPA, 1995).

Table 5 – Groundwater Sample Analytical Methods

Analysis	Method	Analysis	Method
Inorganics	EPA 300.0	Semi-volatile organics	EPA 525.2
Metals	EPA 200.8	Carbamates	SM 21 6610B
Volatile Organics	EPA 524.2	Herbicide metabolites	SCDHS LC/MS
Chlorinated pesticides	EPA 505	Dacthal metabolites	SCDHS HPLC/LC-UV
Microextractables	EPA 504.1	1,4-Dioxane	EPA 522
PFAS	Mod. EPA 537	Perchlorate	EPA 314

Semi - Volatile Organic Compounds

Groundwater samples were analyzed for Semi-Volatile Organic Compounds by the SCPEHL following the “Standard Operating Procedure for Sampling for Semi Volatile Organic Compounds in Aqueous Samples” (US EPA, 2002). The samples were stored on ice at 4° C and transported to the PEHL for analysis using US EPA method 525.2 (US EPA, 1995)

Metals

Groundwater samples were analyzed by the PEHL following the “Standard Operating Procedure for Dissolved Metals for in Aqueous Samples” (US EPA, 2002). The samples were stored on ice at 4° C and transported to the PEHL for analysis using US EPA method 200.8 (US EPA, 1995).

Pesticides

Groundwater samples were analyzed for pesticides by the PEHL following the “Standard Operating Procedure for Sampling for Pesticide Compounds in Aqueous Samples” (US EPA, 2002). The samples were stored on ice at 4° C and transported to the PEHL for validation analysis by US EPA methods 505, 531.1, SM21 6610B, LC-MS and SCM method developed at PEHL.

Radiology

Groundwater samples were analyzed for radiation by the PEHL. The samples were stored on ice at 4° C and transported to the PEHL for validation analysis by US EPA methods 906.0, 900.0 and SM207110C.

1,4-Dioxane

Groundwater samples were analyzed for 1,4-dioxane and were stored on ice at 4° C and

transported to PEHL for validation by US EPA method 522.

PFAS

Groundwater samples were stored at 4° C and were analyzed for 21 analytes by Eurofins Test America using modified method EPA 537.

Perchlorate

Groundwater samples were stored at 4° C and were analyzed for perchlorate by Pace Analytical Laboratory using method EPA 314.

Groundwater Investigation Approach

Summary of Previous Groundwater Investigations:

1998 Perchlorate Investigation

A previous groundwater investigation was initiated at the site in late 1998 due to perchlorate impacts observed in the Suffolk County Water Authority (SCWA) Old Country Road Wellfield located downgradient of the facility. The subsequent groundwater investigation included the installation and sampling of eighteen profile wells at that time. The purpose and scope of this investigation was to determine if a Suffolk County Police fireworks disposal pit located on the northwest side of the police shooting range was the source of the perchlorate contamination observed in the SCWA supply wells. The investigation identified a perchlorate groundwater plume on the site, initiating from the fireworks disposal pit. A south to slightly southeast groundwater flow direction was determined to exist on the site, generally travelling from the fireworks disposal area toward the SCWA wellfield. A treatment system was installed at the SCWA wellfield to remove the perchlorate. Six monitoring wells were sampled for perchlorate annually or bi-annually until 2015. The perchlorate concentrations in these wells exhibited considerable fluctuations during the monitoring period, particularly in the well located nearest to the fireworks disposal pit, BM-1 (Figure 4).

2018 PFAS Sampling

In 2014, one of the three public water supply wells at the adjacent SCWA Old Country Road Wellfield reported a detection of PFOS at 48 nanograms per liter (ng/l). Though no federal or state drinking water standards were available at that time for PFOS, the United States Environmental Protection Agency (USEPA) had established a Health Advisory Level (HAL). Currently the USEPA HAL is 70 ng/l for the combined concentration of PFOS and PFOA. [Note: New York State has recently adopted individual drinking water standards (MCLs) for PFOS and PFOA, each set at 10 ng/L. The public water supply in this area currently meets all drinking water standards.] A subsequent private well survey conducted

Figure 4

Suffolk County
Department of Health Services
BOMARC Facility Investigation
Westhampton, N.Y.

1999 - 2015 Perchlorate Groundwater Results
Existing Permanent Monitoring Wells

BM-1 (30-40 fbg*)

Sample Date	Perchlorate ug/l
7/9/08	275
11/9/09	77
8/30/10	7.5
7/5/11	334
6/26/12	1,118
4/1/13	1,067
4/23/14	84
10/2/14	122
8/6/15	138

Former Fireworks
Disposal Pits

P-1 (40-50 fbg)

Sample Date	Perchlorate ug/l
4/5/00	910
2/1/02	44
6/26/06	69
4/24/07	147
7/9/08	277
11/5/09	168
8/30/10	78
7/5/11	14
6/26/12	2.3
4/1/13	17
4/23/14	7.1
10/2/14	9.4
8/26/15	10

P-3 (40-50 fbg)

Sample Date	Perchlorate ug/l
04/06/00	42
06/26/06	12
04/23/07	5
07/09/08	11
11/09/09	22
08/30/10	7.4
07/06/11	9.7
06/26/12	2.4
04/01/13	2.9
10/02/13	1.1
04/22/14	2.9
10/02/14	1.2
08/6/15	1.0

P-4 (35-45 fbg)

Sample Date	Perchlorate ug/l
04/06/00	760
02/01/02	4
06/26/06	<2
04/23/07	5
07/09/08	4
11/05/09	2.7
08/30/10	28
07/05/11	4.1
06/26/12	0.4
04/01/13	0.9
10/02/13	1.0
04/22/14	0.6
08/26/15	1.4

P-2 (40-50 fbg)

Sample Date	Perchlorate ug/l
04/05/00	66
02/01/02	7
06/26/06	<2
04/24/07	3
07/09/08	10
11/09/09	3.3
08/30/10	6.3
07/06/11	4.3
06/26/12	0.7
04/01/13	0.8
10/02/13	2
04/23/14	2.7
10/02/14	1.2
08/26/15	1.4

P-5 (65-70 fbg)

Sample Date	Perchlorate ug/l
04/13/00	37
02/01/02	<2
06/26/06	<2
04/23/07	38
07/07/08	<2
11/05/09	2.6
08/30/10	38
07/05/11	9.8
06/26/12	0.2
04/01/13	0.4
10/02/13	<0.2
04/22/14	<0.2
10/02/14	0.6
08/05/15	0.9

SCWA
Wellfield

Legend

Monitoring Well

Groundwater Flow Direction



US Survey feet

* fbg - feet below grade



by SCDHS in the vicinity of the SCWA wellfield identified approximately 54 properties potentially served by private wells. Sampling by SCDHS, and PFAS analysis conducted by the New York State Department of Health (NYSDOH) Wadsworth Laboratory, exhibited detections of PFOS and/or PFOA in 25 of the 41 wells sampled, with two wells reporting concentrations of PFOS/PFOA above the USEPA HAL. The NYSDEC subsequently installed POET water treatment facilities at both homes. An additional 11 wells were found to contain PFOS and/or PFOA at levels exceeding the recently adopted New York State MCL of 10 parts per trillion.

In order to obtain PFAS information from the groundwater at the BOMARC facility, the six existing monitoring wells discussed above as part of the 1998-perchlorate investigation were sampled for PFAS in early 2018. Although the locations and depths of these wells were ideally situated to monitor impacts from the fireworks disposal pit located to the west of the police shooting range, data obtained from these wells, although limited, were used to provide some quickly attainable information with respect to PFAS concentrations on a portion of the site. The PFOS and PFOA results of the 2018 sampling effort indicated that PFOS and PFOA were detected in all six of the monitoring wells sampled (Figure 5). Two samples exhibited concentrations in excess of the recently adopted NYSDOH MCL of 10 ng/l individually for PFOS and PFOA: BM-1- PFOS 13.5 ng/l; and P-4-PFOA 10.4 ng/l. BM-1 is located next to the former fireworks disposal pit, and P-4 is located within the vehicle impound yard.

2019 Preliminary Groundwater Investigation Conducted Pursuant to Suffolk County Resolution 1065-2018

This groundwater investigation was designed to provide an initial snapshot of the overall quality of the groundwater at the BOMARC site. The site is a relatively large site, with approximately 100 acres of area in current use. The site also has a long history of different uses that may have resulted in historic impacts to the groundwater. Currently there are three primary site uses: the police shooting range, located on the northern portion of the site; the emergency vehicle obstacle course (EVOC) which is located generally in the center of the site; and an Impound Yard which is primarily located in the southern portion of the site, however there are also many vehicles stored in the central portion of the site as well. The profile wells were arranged in five generalized east-west transects running from the north to the south of the site (Figure 6). To the extent practicable, the transects were oriented perpendicular to the south-southeast groundwater flow direction which was observed in the 1998 perchlorate investigation. It should be noted that all of the wells are not located along straight line transects because of necessary siting adjustments due to

Figure 5
 Suffolk County
 Department of Health Services
 BOMARC Facility Investigation
 Westhampton, N.Y.
 2018 PFOS/PFOA Groundwater Results
 Existing Permanent Monitoring Wells

Screen Interval	BM-1 PFOS ng/l	PFOA ng/l
30-40	13.5	4.9

Screen Interval	P-1 PFOS ng/l	PFOA ng/l
40-50	2.4	4.4

Screen Interval	P-2 PFOS ng/l	PFOA ng/l
40-50	2.3	3.1

Screen Interval	P-3 PFOS ng/l	PFOA ng/l
40-50	3.7	6.8

Screen Interval	P-4 PFOS ng/l	PFOA ng/l
35-45	4.6	10.4

Screen Interval	P-5 PFOS ng/l	PFOA ng/l
65-75	1.0	1.7

SCWA
Wellfield

Legend

- PFOS and/or PFOA Concentration Equal to or Below 10 ng/l
- PFOS and/or PFOA Concentration Above 10 ng/l *

← Groundwater Flow Direction

* In August 2020 the individual NYSDOH drinking water standard of 10 ng/l for PFOS and PFOA became effective.

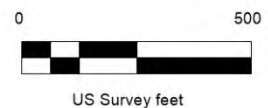
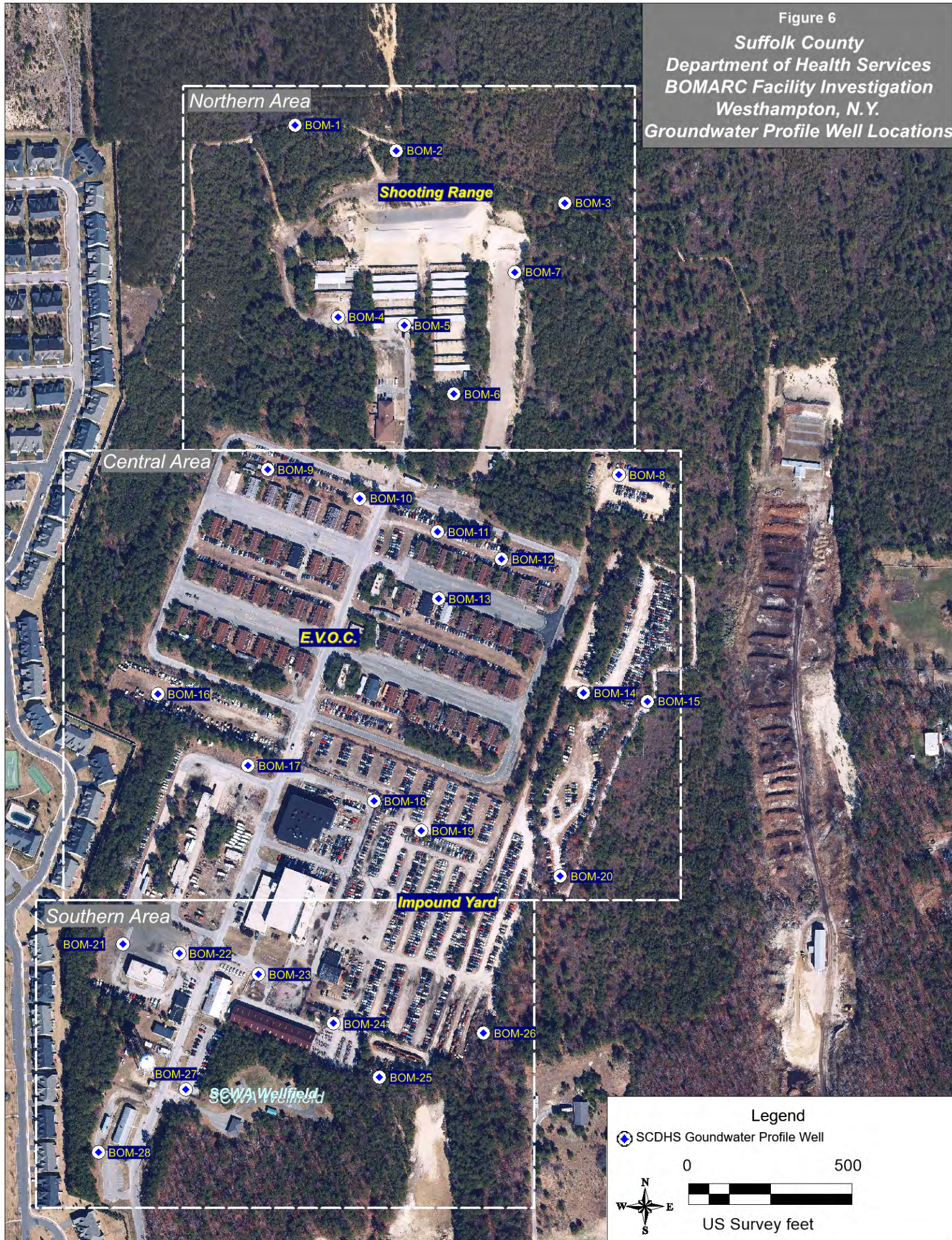


Figure 6
Suffolk County
Department of Health Services
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Westhampton, N.Y.
Groundwater Profile Well Locations



localized constraints. Wells were also located upgradient or downgradient of specific site uses and/or potential contamination source areas (e.g., well BOM-13 was located downgradient of the current fireworks disposal area).

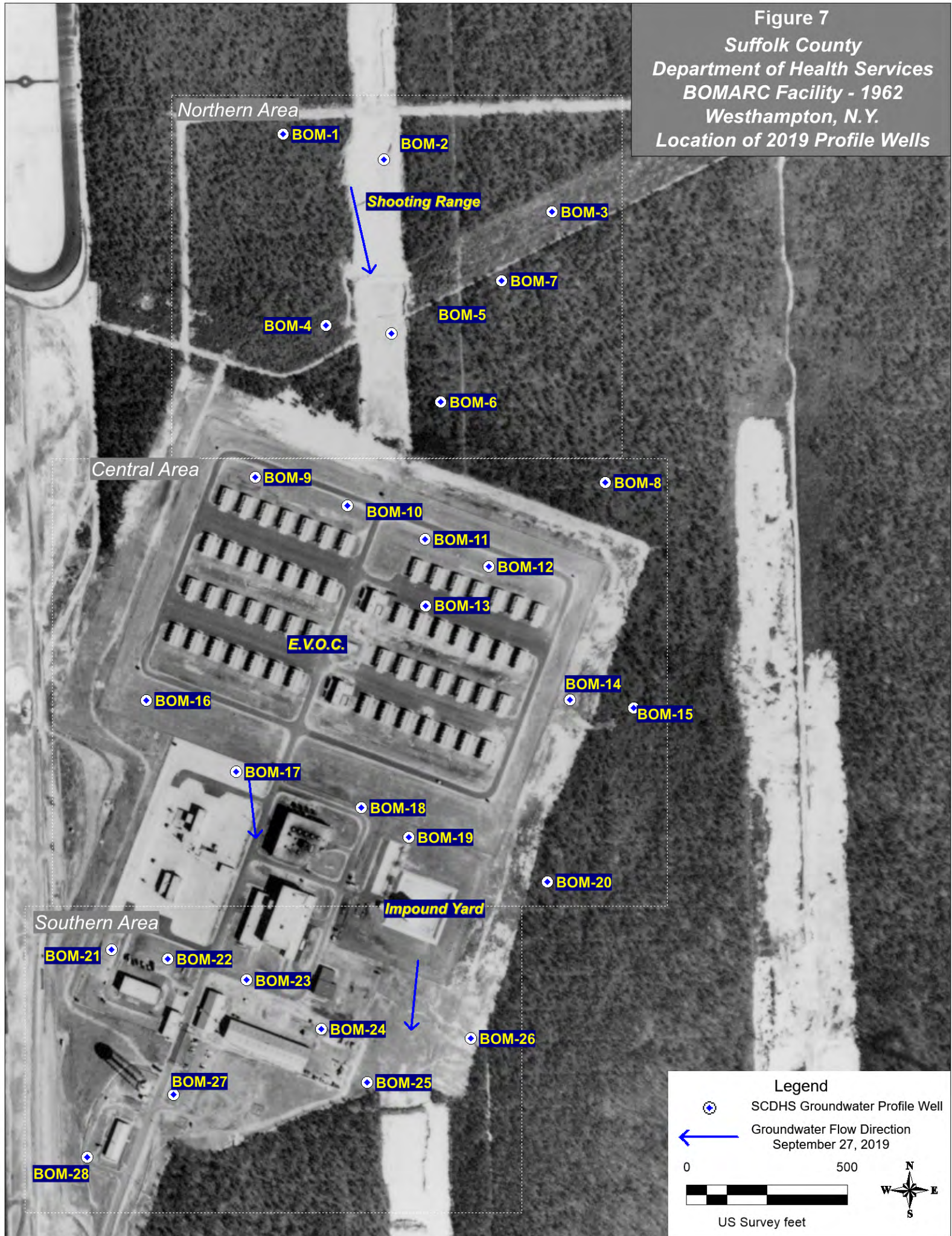
Two transects were located in the Northern Area which consists of the police shooting range. The most northern transect (wells BOM-1, BOM-2 and BOM-3) is located north of the shooting range and was placed upgradient of the currently active portion of the site. The second transect in this area (BOM-4, BOM-5 and BOM-6) is located downgradient of the police shooting range. Two transects were located in the Central Area of the site that contains the EVOC area and portions of the Vehicle Impound Yard. BOM-9 through BOM-13 are located on the northern portion of the EVOC area, downgradient of the police shooting range, and BOM-16 through BOM-20 are located within the northern portion of the main Vehicle Impound Yard, downgradient of the EVOC area. A final transect consisting of wells BOM-21 through BOM-26 is generally located on the southern portion of the active site. BOM-8, BOM-14, BOM-15 and BOM-20 are located on the eastern portion of the site in an area that contains impounded vehicles separated from the main portions of the site. BOM-27 is located in close proximity to the SCWA Old Country Road Wellfield at the southern end of the site, and BOM-28 is the southernmost well located on the western side of the site. Figure 7 illustrates the locations of the wells on the 1962 aerial photograph, in order to provide context to the well locations relative to the active areas when the missile base was in operation.

Most of the wells were drilled to depths that would yield approximately five, ten foot profile sampling levels. The overall depths of the wells varied between seventy and ninety feet below grade (fbg), depending on the specific depth to water encountered. Three of the monitoring wells located in close proximity to the SCWA wellfield (BOM-23, BOM-24 and BOM-25) were drilled to a deeper depth (145 fbg) in order to help assess impacts to the SCWA wells. BOM-23 and 24 yielded eleven profile samples, while BOM-25 yielded twelve profile samples.

Groundwater Flow Direction

In order to determine an updated site-specific groundwater flow direction, 27 of the 28 wells installed were surveyed to a relative benchmark, and groundwater level measurements were collected. The tops of the well casings were surveyed as measuring points after profiling and sampling of the wells was completed, with the wells screened near the top of the water table. Sufficient time was allowed for the wells to equilibrate since the last well was sampled in July. Water level measurements were recorded on September 27, 2019, and

Figure 7
Suffolk County
Department of Health Services
BOMARC Facility - 1962
Westhampton, N.Y.
Location of 2019 Profile Wells



at that time the depth to groundwater varied across the site from approximately 23 feet to 41 fbg (Table 6).

The water level measurement data was used to calculate relative water table elevation heights observed in each of the wells. This information was used to construct groundwater table elevation contours (Figure 8). Groundwater flows perpendicular to the water table elevation contours.

The site specific groundwater flow direction for the site was determined to be primarily south with a very slight easterly component throughout the majority of the site. The Suffolk County Water Authority Old Country Road Well field located just south of the site has 3 active public water supply wells, and an influence on the groundwater flow direction from the pumping of these wells is evident in Figure 8 as curved lines in the vicinity of the wellfield. This indicates that the groundwater flow direction changes and groundwater is flowing toward the wells. This influence appears most pronounced on the west side of the wellfield.

Groundwater Sampling Results

A total of 161 samples were collected in the twenty-eight profile wells installed across the site. An additional six wells (four profile and two permanent wells) were installed and twenty-five samples were collected as a follow-up to detections of tritium in one of the profile wells. All of the water samples were analyzed for the following analytical sample groups: metals, inorganics, Dacthal metabolites, carbamate pesticides, chlorinated pesticides, perchlorate, volatile organic compounds (VOCs), radiologicals, semi-volatile compounds, herbicide metabolites, 1,4-dioxane and PFAS. All samples with the exception of perchlorate and PFAS were analyzed by the SCDHS - PEHL. Perchlorate and PFAS samples were analyzed through a contract with Pace Analytical Laboratories. The findings observed in each of the sampling groups are discussed in the following sections. Appendix F contains a data summary of the analytes that were detected in the groundwater samples collected in this investigation.

Metals

Twenty-four different metals were detected in the groundwater samples. Four metals (iron, lead, manganese and sodium) exhibited concentrations exceeding their respective NYSDOH MCL, or drinking water standard, action level and/or New York State Department of Environmental Conservation (NYSDEC) groundwater standard. Iron concentrations ranged

Figure 8
Suffolk County
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BOMARC Facility Investigation
Westhampton, N.Y.
Relative Water Table Contours



Table 6 - Water Table Elevation Data

Water Level Information – BOMARC Site September 27, 2019								
Well ID	Measuring Pt (feet)	Depth to Water (feet)	Relative Groundwater Elevation (feet)		Well ID	Measuring Pt (feet)	Depth to Water (feet)	Relative Groundwater Elevation (feet)
BOM-1	107.63	31.17	76.46		BOM-15	97.98	25.02	72.96
BOM-2	114.63	38.36	76.27		BOM-16	109.04	35.57	73.47
BOM-3	117.72	41.86	75.86		BOM-17	109.22	36.05	73.17
BOM-4	113.47	37.98	75.49		BOM-18	108.30	35.73	72.57
BOM-5	114.33	38.97	75.36		BOM-19	107.66	35.35	72.31
BOM-6	113.86	38.86	75.00		BOM-20	96.06	24.08	71.98
BOM-7	107.76	32.31	75.45		BOM-21	106.64	34.87	71.77
BOM-8	110.68	36.34	74.34		BOM-22	105.21	-	-
BOM-9	111.71	36.97	74.74		BOM-23	106.06	34.62	71.44
BOM-10	112.07	37.58	74.49		BOM-24	105.42	34.53	70.89
BOM-11	110.43	36.28	74.15		BOM-25	101.96	31.53	70.43
BOM-12	109.67	35.72	73.95		BOM-26	94.55	23.63	70.92
BOM-13	110.28	36.49	73.79		BOM-27	102.81	32.09	70.72
BOM-14	106.54	33.43	73.11		BOM-28	100.00	28.63	71.37

from 0.13 milligrams per liter (mg/l) to 4.7 mg/l, with 150 of the 161 profile well groundwater samples exceeding the MCL of 0.3 mg/l for iron. Lead was detected in 46 of the samples. One sample collected from well BOM-4 at the 75-80 feet below grade (fbg) interval reported a lead concentration of 21 micrograms per liter (µg/l), exceeding the NYSDOH lead action level of 15 µg/l. This well is located in the northwestern portion of the site, hydraulically downgradient of the western part of the shooting range. Manganese was detected in all of the samples collected, with one sample in BOM-27 (75-80 fbg) reporting 346 µg/l, which exceeds the NYSDOH MCL of 300 µg/l. Sodium was also detected in all of the samples, with reported concentrations ranging from 2.7 mg/l to 82 mg/l. Although the NYSDOH does not have an MCL for sodium, 30 samples had concentrations in excess of the 6 NYCRR Part 703 Class GA Groundwater Standard of 20 mg/l.

Inorganic Parameters

A profile level from well BOM-22 (45-50 fbg) had three inorganic parameters exceeding their respective MCL and NYSDEC Groundwater Standard. This was the only sample that exhibited an exceedance of inorganic parameters. The chloride concentration was 470 mg/l, exceeding the MCL and Groundwater Standard of 250 mg/l. The same profile level from

this well exceeded the MCL and Groundwater Standard for nitrate and sulfate. The nitrate concentration was reported to be 27 mg/l, exceeding the MCL and Groundwater Standard of 10 mg/l, and the sulfate concentration was 278 mg/l, exceeding the MCL and Groundwater Standard of 250 mg/l.

Radiologicals

Gross alpha, gross beta and tritium were analyzed in all 161 profile well groundwater samples. Gross alpha was not detected and relatively low concentrations of gross beta (indicative of background concentrations from natural sources) were observed in 92 of the samples. Concentrations of gross beta adjusted for potassium-40 concentrations were less than 5 picocuries per liter (pCi/l), compared with a NYSDOH action level of 50 pCi/l. Three profile levels in well BOM-12 exhibited detections of tritium at 561 ($\pm$ 386) pCi/l, 1,451 ($\pm$ 715) pCi/l and 306 ($\pm$ 43) pCi/l in the 45-50, 55-60 and 65-70 fbg profile intervals, respectively. Although all of these concentrations are significantly below the NYSDOH tritium MCL of 20,000 pCi/l, these detections of tritium are unusual in Suffolk County's groundwater.

In order to confirm these detections and gather more information regarding potential tritium concentrations in the groundwater, six additional wells BOM-29 – BPM 34) were installed in the vicinity (four profile wells and two permanent wells, Figure 9 and Figure 10), and twenty-five samples were collected. Samples were analyzed for radiation, as well as all the full suite of SCDHS-PEHL analyses (PFAS and perchlorate were not analyzed in these samples). Results of this supplemental sampling effort indicated no additional detections of tritium in any of the samples (all samples were reported as < 200 pCi/l). The results of all the other parameters were consistent with what was observed in the groundwater from the other wells across the site, primarily 24 of the 25 samples exceeded the 0.3 mg/l MCL for iron (the highest observed was 4.86 in the 45-50 fbg profile level of well BOM-31). One sample exceeded the 300 μ g/l MCL for manganese (353 μ g/l in BOM-31- 65-70 fbg). One sample exceeded the 20 mg/l NYSDEC Groundwater Standard for sodium (35 mg/l in BOM-32-35-40 fbg). A summary of the sampling results of these twenty-five supplemental wells are included in Appendix F.

Perchlorate

Perchlorate was detected in eighteen samples in nine different wells (Figure 11). The concentration of 18.6 μ g/l in BOM-13 (35-40 fbg) was the only sample that exceeded the NYSDOH action level of 18 μ g/l. Perchlorate detections were reported in all five profile levels of BOM-13. This well is located downgradient of the current fireworks disposal

Figure 9
Suffolk County
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Westhampton, N.Y.
Tritium Groundwater Results



Figure 10
Suffolk County
Department of Health Services
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Westhampton, N.Y.
Tritium Groundwater Results
Area of Detail

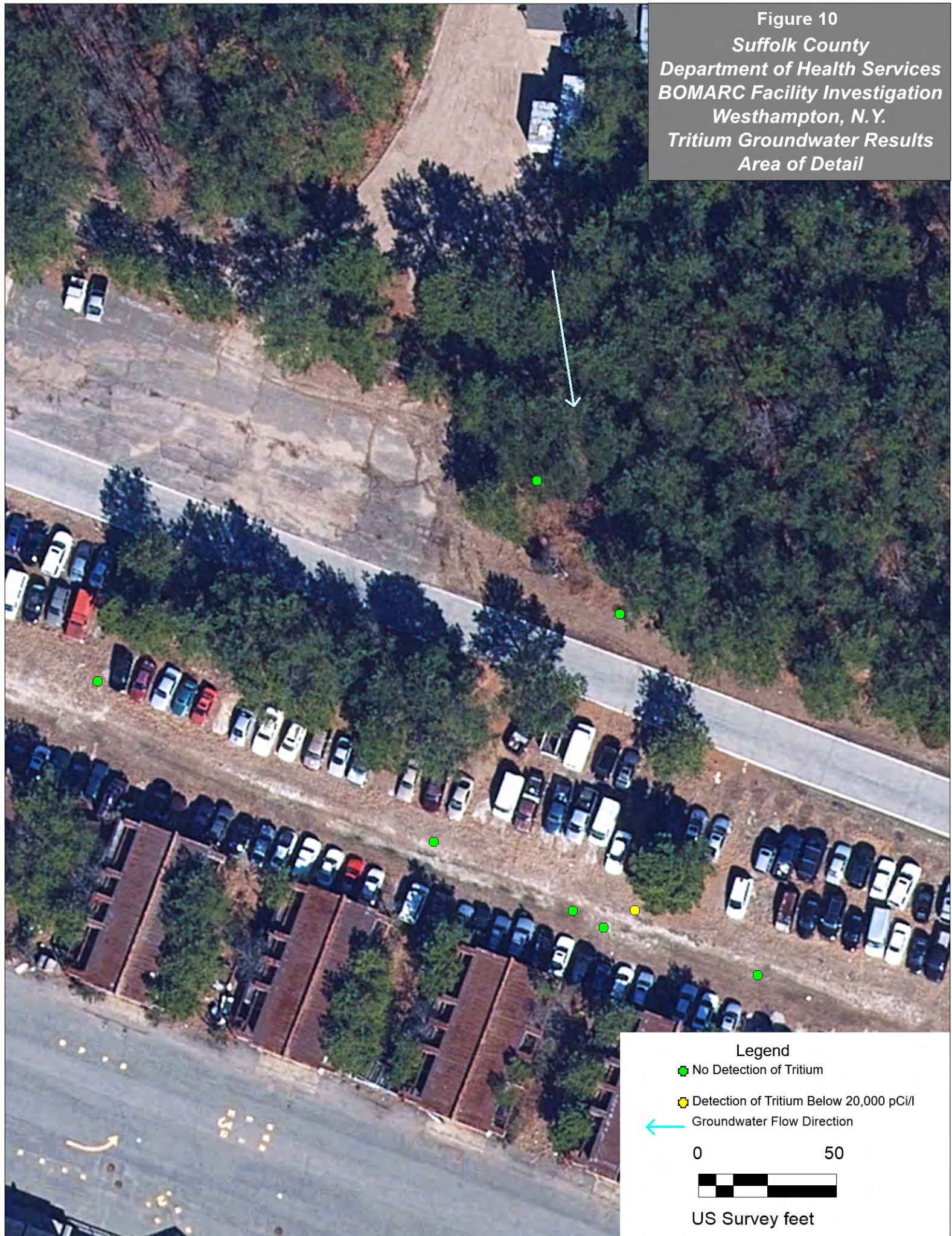
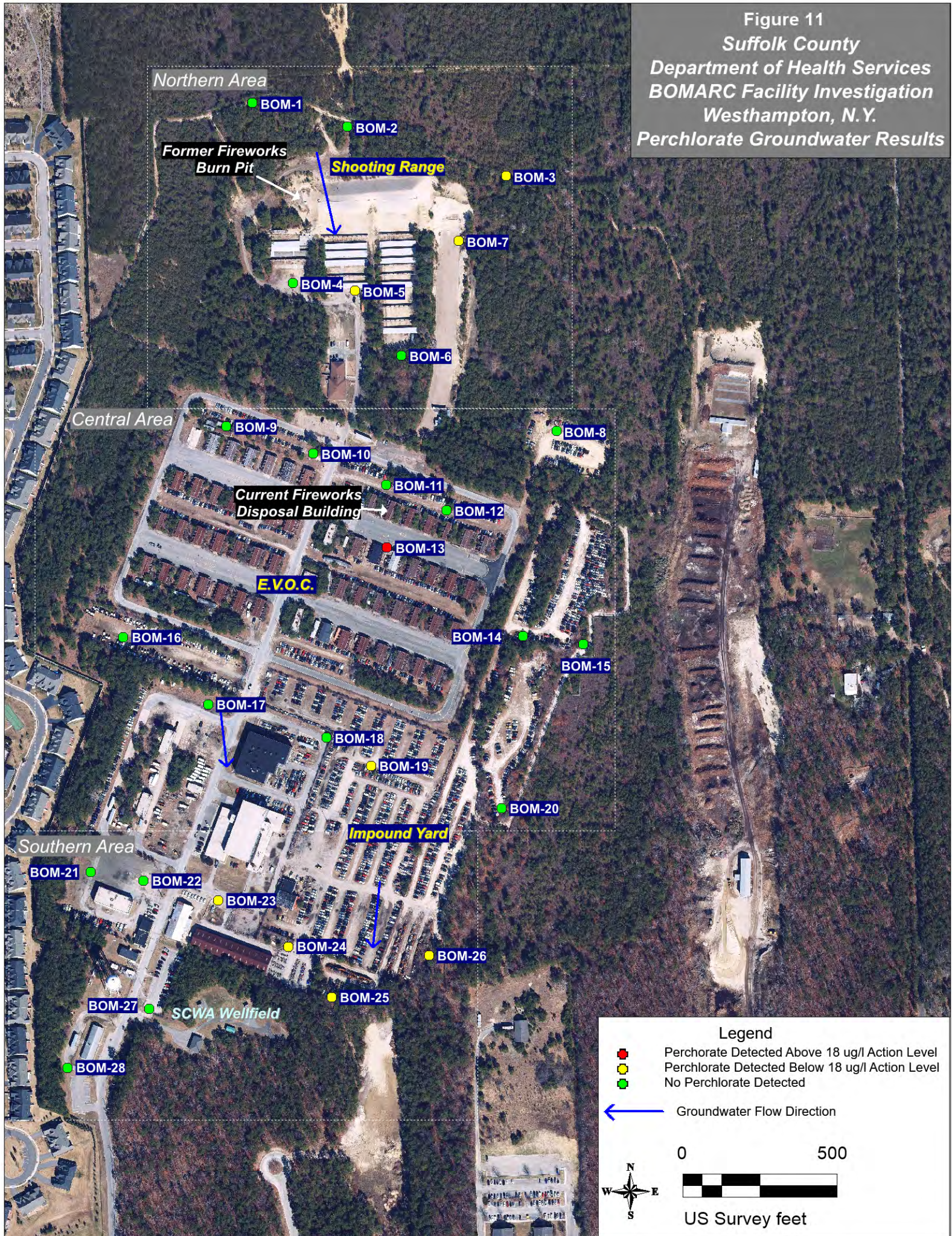


Figure 11
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Department of Health Services
BOMARC Facility Investigation
Westhampton, N.Y.
Perchlorate Groundwater Results



location. BOM-24 had perchlorate detections in four profile levels (60-65 fbg, 70-75 fbg, 80-85 fbg and 90-95 fbg) ranging from 1.3 µg/l to 10.8 µg/l. Two other perchlorate detections of note were 12.6 µg/l in BOM-19 (35-40 fbg) and 8.2 µg/l in BOM-23 (50-55 fbg).

Semi-Volatile Organic Compounds

Semi-volatile organic compounds (SVOCs) were analyzed in all of the 161 groundwater samples collected. Three SVOCs were detected, (Bisphenol A, Dichlorvos, Diethyltoluamide (DEET)) at trace or low concentrations (less than 1 µg/l). These concentrations are significantly below the 50 µg/l MCL.

Herbicide Metabolites

Four analytes in the Herbicide Metabolite analysis group were detected. Metolachlor metabolite (CGA-67125), 2-HydroAtrazine, Phenytoin (Dilatin) and Trichlorfon. The concentrations of all of these detections were less than 2 µg/l, significantly below the 50 µg/l MCL.

Volatile Organic Compounds (VOCs)

Chloroform was the only volatile organic compound detected in the groundwater samples analyzed as part of this investigation. There were eighty-two detections of chloroform in 26 of the 28 profile wells. The detected concentrations of chloroform ranged from 0.5 µg/l to 2.1 µg/l, which are below both the 6 NYCRR Part 703 groundwater standard of 7 µg/l and the NYSDOH MCL of 80 µg/l.

1,4-Dioxane

Two detections of 1,4-dioxane were reported; 0.18 µg/l in well BOM-4 (75-80 fbg), and 0.20 µg/l in BOM-21 (45-50 fbg). Both of these concentrations are below the recently adopted drinking water standard or maximum contaminant level (MCL) for 1,4-dioxane of 1 µg/L.

Per- and Polyfluoroalkyl Substances (PFAS)

Twenty-one different PFAS parameters were analyzed in each of the samples. Seventeen of the twenty-one PFAS parameters were detected. Twenty-six of the twenty-eight profile wells had at least one PFAS parameter detected (Figure 12). The NYSDOH has recently adopted drinking water standards (MCLs) for PFOS and PFOA, each at 10 ng/l. Figure 13 through Figure 15 illustrate the well locations and profile sample level PFOS and PFOA results for the wells located in the Northern, Central, and Southern Areas of the site.

Figure 12
 Suffolk County
 Department of Health Services
 BOMARC Facility Investigation
 Westhampton, N.Y.
 PFOS/PFOA Groundwater Results



Figure 13
Suffolk County
Department of Health Services
BOMARC Facility Investigation
Westhampton, N.Y.
Northern Area
PFOS/PFOA Groundwater Results

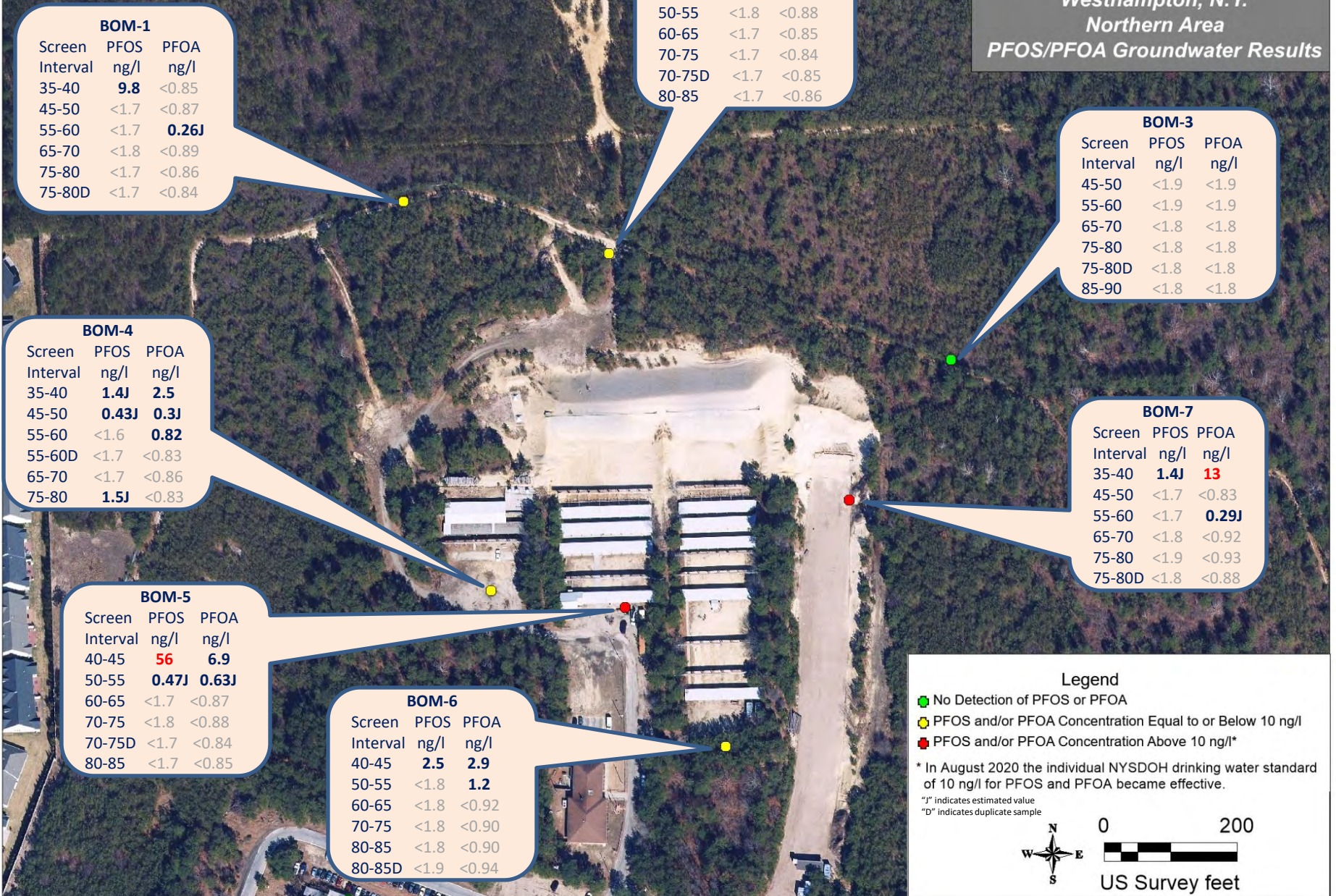


Figure 14
Suffolk County
Department of Health Services
BOMARC Facility Investigation
Westhampton, N.Y.
Central Area
PFOS/PFOA Groundwater Results

BOM-9

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	<1.8	<0.89
45-50	<1.8	<0.90
55-60	<1.8	<0.89
65-70	<1.8	<0.89
65-70D	<1.8	<0.89
75-80	<1.8	<0.89

BOM-10

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	<1.9	3.8
45-50	1.5J	0.9J
55-60	<1.9	<1.9
55-60D	<1.9	<1.9
65-70	<1.9	<1.9
75-80	0.77J	<1.9

BOM-11

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	2	11
45-50	1.7J	2.3
45-50D	1.7J	2.4
55-60	<2	<2
65-70	<1.9	<1.9
75-80	<2	<2

BOM-8

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	<1.8	2
45-50	<1.8	<0.89
55-60	<1.8	<0.88
65-70	<1.8	<0.88
75-80	<1.8	<0.91
75-80D	<1.8	<0.91

BOM-16

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	0.46J	1.4
45-50	7.6	5.6
55-60	9.2	8.9
65-70	4.8	3.8
75-80	4.7	5.6
75-80D	4.5	5.8

BOM-13

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	2.3	4.2
45-50	75	7
55-60	38	6.2
65-70	11	1.8
75-80	4.7	<0.90
75-80D	4.8	<0.86

BOM-12

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	0.82J	1
45-50	1.1J	1.9
55-60	<1.8	0.84J
55-60D	<1.8	0.91J
65-70	1J	<0.85
75-80	<1.7	<0.87

BOM-14

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	2.6	8
45-50	<1.8	3.1
55-60	<1.8	1.8
65-70	<1.8	2.9
75-80	<1.8	<1.8
75-80D	<1.8	<1.8

BOM-17

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	0.73J	1.2
45-50	6.8	5.6
55-60	22	4.2
65-70	3.6	2.1
75-80	5.2	9.1
75-80D	5.1	13

BOM-15

Screen Interval	PFOS ng/l	PFOA ng/l
25-30	<1.8	0.8J
35-40	<1.7	<0.86
45-50	<1.7	<0.87
55-60	<1.8	<0.89
65-70	<1.7	<1.7
65-70D	<1.8	<1.8

BOM-18

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	2.5	4.1
55-50	1.2J	1.8
45-50D	0.66J	1.5J
55-60	0.52J	0.83J
65-70	<1.8	<1.8
75-80	<1.7	<1.7

BOM-19

Screen Interval	PFOS ng/l	PFOA ng/l
35-40	39	15
45-50	4.7	6.6
55-60	1.3J	1.7
65-70	<1.9	<1.9
75-80	<1.9	<1.9
75-80D	<1.9	3.8

BOM-20

Screen Interval	PFOS ng/l	PFOA ng/l
25-30	<1.9	<1.9
35-40	5.8	3.1
45-50	2.1	3.7
55-60	<1.9	1.7J
65-70	<1.9	<1.9
65-70D	1.3J	<1.9

Legend

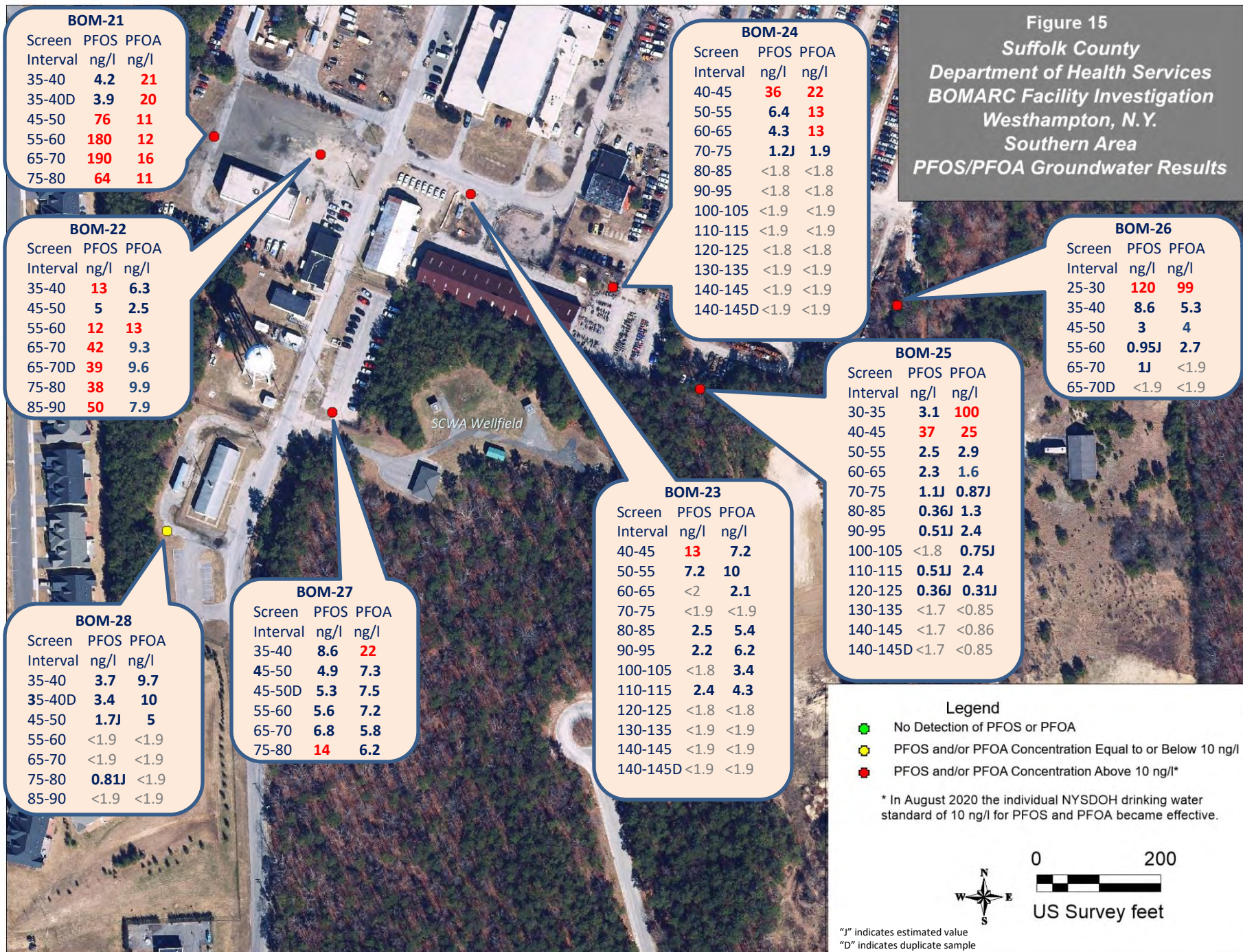
- No Detection of PFOS or PFOA
- PFOS and/or PFOA Concentration Equal to or Below 10 ng/l
- PFOS and/or PFOA Concentration Above 10 ng/l*

* In August 2020 the individual NYSDOH drinking water standard of 10 ng/l for PFOS and PFOA became effective.



"J" indicates estimated value
"D" indicates duplicate sample

Figure 15
Suffolk County
Department of Health Services
BOMARC Facility Investigation
Westhampton, N.Y.
Southern Area
PFOS/PFOA Groundwater Results



PFOS and/or PFOA

Twenty-seven samples and 3 duplicate samples in thirteen different profile wells had PFOS and/or PFOA concentrations in excess of the recently adopted New York State MCLs of 10 ng/l. The profile wells that exhibited at least one PFOS and/or PFOA concentration exceeding 10 ng/l are summarized in Table 7.

Table 7
Profile Well and Sampling Interval Exceeding NYSDOH MCL

Profile Well	Sample Depth (feet below grade)	PFOS (ng/l)	PFOA (ng/l)
BOM-5	40-45	56	6.9
BOM-7	35-40	1.4J	13
BOM-11	35-40	2	11
BOM-13	45-50	75	7
	55-60	38	6.2
	65-70	11	1.8
BOM-17	55-60	22	4.2
	75-80D	5.1	13
BOM-19	35-40	39	15
BOM-21	35-40	4.2	21
	35-40D	3.9	20
	45-50	76	11
	55-60	180	12
	65-70	190	16
	75-80	64	11
BOM-22	35-40	13	6.3
	55-60	12	13
	65-70	42	9.3
	65-70D	39	9.6
	75-80	38	9.9
	85-90	50	7.9
BOM-23	40-45	13	7.2
BOM-24	40-45	36	22
	50-55	6.4	13
	60-65	4.3	13
BOM-25	30-35	3.1	100
	40-45	37	25
BOM-26	25-30	120	99
BOM-27	35-40	8.6	22
	75-80	14	6.2

Note: J is a laboratory qualifier that indicates an estimated value
D indicates a duplicate sample

Significant PFAS Concentrations Other than PFOS and/or PFOA

In addition to PFOS and PFOA, six other PFASs (6:2FTS, PFBA, PFHpA, PFHxA, PFHxS, PFPeA) were detected in four different profile wells above 100 ng/l. The wells and sampling intervals of these detections are summarized in Table 8 through Table 13.

Table 8 - 6:2FTS

Profile Well	Sample Depth (feet below grade)	6:2FTS ng/l
BOM-25	30-35	210
BOM-26	25-30	160

Table 9 - PFBA

Profile Well	Sample Depth (feet below grade)	PFBA ng/l
BOM-25	30-35	150

Table 10 - PFHpA

Profile Well	Sample Depth (feet below grade)	PFHpA ng/l
BOM-25	30-35	230
BOM-26	25-30	350

Table 11 - PFHxA

Profile Well	Sample Depth (feet below grade)	PFHxA ng/l
BOM-25	30-35	830
BOM-26	25-30	230

Table 12 - PFHxS

Profile Well	Sample Depth (feet below grade)	PFHxS ng/l
BOM-21	55-60	110
	65-70	160
BOM-22	75-80	110
BOM-25	40-45	120
BOM-26	25-30	120

Table 13 - PFPeA

Profile Well	Sample Depth (feet below grade)	PFPeA ng/l
BOM-25	30-35	650
BOM-26	25-30	210

Dacthal Metabolites, Chlorinated Pesticides, Carbamate Pesticides

There were no reported detections of any parameters in the Dacthal metabolite, chlorinated pesticide, or carbamate pesticides analytical sampling groups.

Reporting Requirements

When a compound exceedance relative to SOP No.9-95 is detected, remediation of the impacted structure(s) is/are required by Articles 7 and 12 of the Suffolk Sanitary Code. Such exceedances are reported to SCDHS for remediation oversight.

However, the determination whether a remediation is required due to detections for compounds regulated by NYSDEC Part 375 is more complex. All exceedances of Part 375 must be reported to NYSDEC. The appropriate SCOs are determined by the proposed future use of the property and fall under one of seven categories:

<u>Category</u>	<u>Description</u>
Unrestricted:	No restrictions on the site for the protection of public health, groundwater and ecological resources due to contaminants present.
Residential:	Residential (Single family housing only).
Restricted Residential:	Includes active recreational and public use with reasonable potential for soil contact. Restricts vegetable garden use.
Commercial:	Primary purpose of buying, selling or trading of merchandise or services. Limited potential for soil contact.
Industrial:	Primary purpose of manufacturing, production or fabrication. Limited potential for soil contact.
Protection of Ecological Resources:	Presence of fish and wildlife, plants and habitats both on or adjacent to the site.
Protection of Groundwater:	Identified soil contamination can threaten the quality of groundwater.

The magnitude of remediation work to be completed greatly depends upon the selection of the SCO outlined above, and generally increases with a more stringent classification.

Next Steps

The groundwater and soil sampling data was reported to and discussed with the NYSDEC and the New York State Department of Health. Four UIC systems will require remediation under Suffolk County SOP 9-95. However, due to PCB contamination in many of these UICs, Suffolk County will work with the NYSDEC in developing appropriate remedial action.

On December 5, 2019, Suffolk County was notified that the BOMARC site was being considered a potential inactive hazardous waste disposal site. SCDHS has begun discussion on next steps with NYSDEC, including characterization of other potential PFAS sources of concern in the area, including a former drag racing strip, the Old Westhampton Landfill, possible foam use related to the Pine Barrens Wildfires of 1995, and local sewage treatment plants.