BRAC Program Management Office East
Philadelphia, Pennsylvania

Final
Action Memorandum for Per- and Polyfluoroalkyl Substances Groundwater Remediation

Building 680 and Site 5 – Fire Training Area

Former Naval Air Station Joint Reserve Base Willow Grove
Horsham Township, Pennsylvania

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ACRONYMS AND ABBREVIATIONS

AFFF	Aqueous film-forming foam
AGVIQ	AGVIQ, LLC
ANG	Air National Guard
ARAR	Applicable or relevant and appropriate requirement
bgs	Below ground surface
BRAC	Base Closure and Realignment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DoD	Department of Defense
DRBC	Delaware River Basin Commission
EE/CA	Engineering Evaluation / Cost Analysis
EPA	U.S. Environmental Protection Agency
ESCA	Environmental Services Cooperative Agreement
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
FS	Feasibility study
GAC	Granular activated carbon
gpm	Gallon(s) per minute
GWETS	Groundwater extraction and treatment system
GWTS	Groundwater treatment system
HWSA	Horsham Water and Sewer Authority
IRP	Installation Restoration Program
IX	Ion exchange
NAS	Naval Air Station
NASJRB	Naval Air Station Joint Reserve Base
NAVD88	North American Vertical Datum of 1988
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No further action
ng/L	Nanogram per liter
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTCRA	Non-Time-Critical Removal Action
O&M	Operations and maintenance
OMB	Office of Management and Budget
OU	Operable unit
PA	Preliminary assessment
PADEP	Pennsylvania Department of Environmental Protection
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PMO	Program Management Office

PRSC	Post-Removal Site Control
PSL	Project Screening Level
RAB	Restoration Advisory Board
RAO	Removal Action Objective
Resolution	Resolution Consultants
RI	Remedial investigation
ROD	Record of Decision
RSL	Regional Screening Level
TBC	To Be Considered
TCRA	Time-Critical Removal Action
U.S.C.	U.S. Code
UU/UE	Unlimited Use and Unrestricted Exposure

I. PURPOSE

The purpose of this Action Memorandum for Per- and Polyfluoroalkyl Substances (PFAS) Groundwater Remediation is to document the decision by the U.S. Department of the Navy (Navy) to conduct a Non-Time-Critical Removal Action (NTCRA) for the extraction and treatment of certain groundwater impacts at and emanating from former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove located in Horsham Township, Pennsylvania (Figure 1). This Action Memorandum has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the U.S. Environmental Protection Agency (EPA) *Superfund Removal Guidance for Preparing Action Memoranda* (EPA, 2009b), and the Navy *Environmental Restoration Program Manual* (Navy, 2018).

The information in this Action Memorandum summarizes that provided in the Engineering Evaluation/Cost Analysis (EE/CA) for Building 680 and Installation Restoration Program (IRP) Site 5 – Former Fire Training Area (IR Site 5) (Tetra Tech, 2024). The NTCRA will be conducted to reduce potential risks to the public health, welfare, and the environment posed by reducing PFAS mass in groundwater across the Base and off-Base in accordance with the Department of Defense (DoD) policy memorandum, dated September 3, 2024. According to the 2024 Directive, action is deemed necessary when PFAS levels are at or above three times the National Primary Drinking Water Standards (NPDWS) maximum contaminant levels (MCL) values EPA issued in April 2024. PFAS in groundwater is not limited to Building 680 and IRP Site 5, so the subject “Site” is PFAS-impacted groundwater at the former Base. The Navy is conducting this removal action under the CERCLA framework with lead regulatory oversight by EPA Region 3. Additional regulatory review contributions are anticipated by the Pennsylvania Department of Environmental Protection (PADEP) and the Delaware River Basin Commission (DRBC).

II. SITE CONDITIONS AND BACKGROUND

This section presents the description, location, and background for the former NASJRB Willow Grove, the physical characteristics and past releases from the Site, and the site regulatory status.

A. Site Description

Former NASJRB Willow Grove was originally a private airfield established in 1919. In 1926, Harold Pitcairn purchased the property to develop, build, test, and fly different types of aircraft. The Navy acquired a 516-acre parcel of the property in 1942; the airfield was commissioned as Naval Air Station (NAS) Willow Grove in January 1943. NAS Willow Grove was designated a Naval Air Reserve Training Station following World War II. The primary purpose of NASJRB Willow Grove was to provide support for aviation training operations and Navy reserve training. The facility also supported Department of Defense (DoD) tenants such as the U.S. Marine Corps and U.S. Army Reserve. In 1957, the DoD purchased

additional land, and the Base area increased to over 1,088 acres, including the 161.7 acres that were deeded to the U.S. Air Force. The Air Force maintained its own facilities and aircraft but used the airfield and associated facilities on a joint-user basis. The Navy provided emergency services and flight control operations. Many of the buildings currently on-Base were constructed during World War II.

Previous activities at NASJRB Willow Grove included landfilling, fire training exercises, and material storage, which resulted in 12 IRP sites and 13 operable units (OUs). Former NASJRB Willow Grove currently has four IRP sites in various stages of investigation and cleanup. Eight sites were recommended for no action or no further action (NFA) under CERCLA. A Federal Facility Agreement (FFA) was finalized on June 27, 2005, between the Navy, EPA, and PADEP (EPA and Navy, 2005). The FFA ensures that environmental impacts associated with the sites at former NASJRB Willow Grove are fully investigated and proper response actions are taken.

In 2005, NASJRB Willow Grove was designated for closure under the authority of the Defense Base Closure and Realignment Act (BRAC) of 1990, Public Law 101-510, as amended. In September 2009, the Navy transferred 18.25 acres to the Air Force (as part of the BRAC 2005 requirement) to construct a consolidated Armed Forces Reserve Center. In December 2011, an additional 27 acres were transferred to the Air Force. NASJRB Willow Grove was officially disestablished on 30 March 2011, and was transferred to the Navy BRAC Program Management Office (PMO) and entered caretaker status in September 2011. A conceptual redevelopment plan has been developed, and the anticipated future use of former NASJRB Willow Grove includes a mixture of residential, recreational, and commercial development.

Documented PFAS use at former NASJRB Willow Grove includes aqueous film-forming foam (AFFF) used for firefighting. AFFF was developed by the Navy in the 1960s for firefighting/training. Based on interviews with knowledgeable site personnel, AFFF was reportedly used on-Base from the 1970s through 2011, after which all storage tanks containing AFFF were emptied and properly closed in-place. Other materials commonly associated with PFAS were also used and stored on-Base.

1. Removal Site Evaluation

Discharges of AFFF occurred during historical firefighter training activities and/or normal airfield operations. PFOA and/or PFOS are components of some AFFF solutions. PFOA and PFOS were first detected in groundwater at IR Site 5 (OU2) in 2011 (Navy, 2012). Additional investigation of PFOA/PFOS at the former Base was initiated in 2014 for the evaluation of potential PFAS source areas. This evaluation is considered the CERCLA Preliminary Assessment (PA) component for PFAS at the former Base. Primary and secondary potential PFAS source areas were identified based on the use/storage and potential presence of PFAS-containing products at each potential source area (Resolution, 2016). A multi-phased remedial investigation (RI) was initiated in 2014 to assess the impacts of and risks from PFAS in

groundwater, surface water, soil, and sediments at former NASJRB Willow Grove at OU 12, which encompasses the entirety of the former Base. The RI included monitoring well installation, and groundwater, surface water, soil, and sediment sampling and analysis. Phase 1 of the PFAS RI was completed in 2019 (Resolution, 2019). PFOA and PFOS were detected in groundwater across the Base, with the highest concentrations at IR Site 5 (and vicinity) and Building 680 (and vicinity).

2. Physical Location

Former NASJRB Willow Grove is in Horsham Township, Montgomery County, in southeastern Pennsylvania, approximately 20 miles north of Philadelphia. Keith Valley Road bounds the former Base to the north, which is also bordered by State Route 611 to the east, and State Route 463 (Horsham Road) to the southwest (Figure 1). The former Base is surrounded by commercial and residential properties to the north, east, and south; manufacturing companies are located to the west.

3. Site Characteristics

The former Base occupies approximately 900 of the 1,100 acres that DoD maintains. Biddle Air National Guard (ANG) Base, formerly known as the Horsham ANG Station or the United States Air Force Air Reserve Station, occupies approximately 200 adjacent acres northeast of former NASJRB Willow Grove.

Multiple off-Base potable supply wells operate in proximity to the former NASJRB Willow Grove Base perimeter. The depths of these wells are typically at least 400 feet bgs and they are high-capacity, typically producing several hundred gallons per minute [gpm] of groundwater. Nearby public supply wells are operated by the Horsham Water and Sewer Authority (HWSA) and the North Wales Water Authority to provide drinking water. Clusters of smaller, shallow private residential wells are located in several Horsham Township neighborhoods surrounding the base.

Former NASJRB Willow Grove lies within the Triassic Lowlands Section of the Piedmont Physiographic Province. This section is characterized by rolling topography. The former Base occupies a relative topographic high, which largely precludes surface water flow onto the facility from surrounding areas. Surface elevations range from 240 feet above the North American Vertical Datum of 1988 (NAVD88) in the northern portion of the former Base, approximately 350 to 260 feet above NAVD88 near the central portion, and 280 feet above NAVD88 in the southern portion. Slopes are generally less than three percent; however, some slopes are steeper in areas where the land has been regraded.

Beneath the soil, the former Base and surrounding area are underlain by the Stockton Formation, which consists of Triassic-age sedimentary rocks. Regionally, the Stockton Formation is subdivided into three units known as the lower arkose, the middle arkose, and the upper shale members. The uppermost member is the middle

arkose member, which is approximately 4,200 feet thick and consists of fine- to medium-grained arkose sandstone interbedded with red siltstone and mudstone. The beds of the Stockton Formation in the area generally strike to the east-northeast and dip 7 to 9 degrees to the northwest. The local strike and dip of bedrock are north 76 degrees east, 7 degrees northwest, and vertical fractures are common (Resolution, 2019).

The former Base is situated within an upland area that forms a local drainage divide between the Little Neshaminy Creek drainage basin to the north and the Pennypack Creek drainage basin to the south. Both local drainage basins lie within the regional drainage basin of the Delaware River. Most of the former Base property drains toward the north through several unnamed ephemeral, intermittent, and perennial drainage ways into Park Creek, a tributary of Little Neshaminy Creek. The extreme southwestern portion of the former Base lies within the Pennypack Creek drainage basin.

Soils at the Base consist chiefly of clay and clayey silt with minor amounts of sand that formed through the weathering of the underlying sandstone, siltstone, and mudstone bedrock. These types of dense, fine-grained soils tend to limit contaminant migration through the soil column, as compared to more loosely packed, larger-grain soils. Disturbed soil and fill material are commonly encountered due to historical construction activities. The soil column (depth from the ground surface to the top of weathered bedrock) reaches a maximum thickness of about 20 feet. However, this thickness does not occur everywhere across the former Base.

Throughout most of the former Base, the water table exists primarily in the shallow bedrock. Groundwater is generally encountered from 5 to 25 feet below ground surface (bgs) (Tetra Tech, 2011).However, limited groundwater in the soil (overburden) is also present. Therefore, soil pore water just above the water table is typically a worst-case indicator of current soil impact on local groundwater quality, although other site characteristics (e.g., soil type and properties, depth to groundwater, oxidation- reduction conditions, etc.) may play a role in PFAS soil to groundwater migration. Additionally, depending on the age of releases, the potential for transformation of PFAS pre-cursors to other PFAS may occur away from the release point, and groundwater may have elevated concentrations away from the source.

The Stockton Formation forms a complex, heterogeneous, multi-aquifer system with a series of gently dipping lithologic units with different hydrologic properties and partially connected zones of high permeability (Sloto, 2001). Permeability often differs from one lithologic unit to another. Groundwater in the unweathered zone moves through a network of interconnected secondary openings (fractures, bedding planes, and joints). Groundwater in the weathered zone moves through intergranular openings that have formed because of weathering. Permeability can be poor in the

weathered zone due to a high clay percentage from weathered mudstone and siltstone. The vertical fractures hydraulically connect beds of the Stockton Formation, and groundwater can move across beds, especially in the direction of dip rather than through individual beds. Most groundwater movement through the bedrock occurs through interconnected networks of fractures, bedding planes, and joints.

The former Base occupies one of the highest topographic positions in the area and straddles a regional surface water and groundwater divide. Under normal conditions, groundwater flows in a generally outward pattern away from the Base and towards these off-Base well locations. However, groundwater modeling of the local area indicates that the hydraulic stresses induced by well pumping modify the groundwater migration pathways and flow velocities by changing the horizontal and vertical distributions of the hydraulic head, thereby altering the hydraulic influence of different fractures, joints, and bedding planes within the complicated and variably interconnected network of secondary openings in the bedrock (Goode and Senior, 2020).

4. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

The NTCRA is intended to address PFOA and PFOS in groundwater, which are defined as hazardous substances in Section 101(14) of CERCLA. Other CERCLA hazardous substances at the former NASJRB Willow Grove are being addressed separately under CERCLA, including solvents, metals, polychlorinated biphenyls, pesticides, herbicides, and dioxins.

Releases of PFOS and PFOA have been detected in on- and off-Base groundwater monitoring wells. At Building 680 (and vicinity), PFOA concentrations range from non-detect to 6,126 ng/L (680X6I, August 2020) and PFOS concentrations range from 18.4 (BWMW-16-365, April 2016) to 150,479 ng/L (680X6I, August 2020). At IR Site 5 (and vicinity), PFOA concentrations range from 92 ng/L (05MW15S, April 2016) to 37,700 ng/L (05MW01S, September 2017), and PFOS concentrations range from 13.4 ng/L (HN-109S, April 2015) to 8,110 ng/L (05MW11I, August 2014).

5. National Priorities List Status

Former NASJRB Willow Grove was placed on the National Priorities List (NPL) (EPA ID# PAD987277837) on September 29, 1995. Former NASJRB Willow Grove is being investigated under the Navy IRP. Twelve IRP sites and 13 OUs are in various stages of the multi-step process toward final disposition; the Navy is pursuing disposition jointly with EPA and PADEP.

6. Maps, Pictures, and Other Graphic Representation

Referenced figures (Figures 1 through 4) are provided at the end of this Action Memorandum. Additional figures are provided in the EE/CA (Tetra Tech, 2024).

B. Other Actions to Date

1. Previous Actions

Former NASJRB Willow Grove currently has four IRP sites and a Basewide PFAS Operable Unit (OU12) in various stages of investigation and cleanup. Eight other sites were recommended for no action or NFA.

In 2011, PFAS were detected in existing IR Site 5 monitoring wells. PFOA (up to 33,000 ng/L) and PFOS (up to 4,600 ng/L) were detected at concentrations greater than the EPA provisional health advisory levels in place at that time: 400 ng/L for PFOA and 200 ng/L for PFOS (EPA, 2009a). In 2014, PFOA and PFOS were detected at concentrations greater than the EPA provisional health advisory levels in both on- and off-Base potable supply wells. In 2014, a Time-Critical Removal Action (TCRA) was initiated to provide alternative water supplies to affected residents (BRAC PMO East, 2015). At the same time, a NTCRA was initiated to provide treatment at HWSA supply wells that exhibited PFOA or PFOS concentrations equal to or greater than EPA provisional health advisory levels, and to extend public water supply to locations with private wells that exhibited PFOA and PFOS concentrations equal to or greater than the EPA provisional health advisory levels. In May 2016, the EPA's Office of Water issued lifetime health advisory levels for PFOS and PFOA. The 2016 EPA lifetime health advisory levels are 70 ng/L for both PFOS and PFOA, individually or as the sum of the two (EPA, 2016a and 2016b, respectively).

An evaluation of potential PFAS source areas was conducted in 2014. Primary and secondary potential source areas were identified based on the potential presence of PFAS-containing products used or stored at each potential source area (Resolution, 2016); this evaluation is considered the CERCLA PA for PFAS at the former Base.

The ongoing, multi-phased basewide PFAS RI began in 2014 at the potential source areas and included monitoring well installation, and sampling and analysis of groundwater, surface water, soil, and sediment. Initial investigative activities included sampling the groundwater from 34 on-Base monitoring wells.

The Navy completed the Phase I RI report for PFAS in 2019 (Resolution, 2019). During the Phase I RI, PFOA and PFOS were detected in groundwater across the former Base, with the highest concentrations at IR Site 5 (and vicinity) and at Building 680 (and vicinity); detected concentrations were above both the EPA Drinking Water lifetime drinking water health advisories and the EPA regional screening levels (RSLs) for PFOS and PFOA in drinking water. Additionally, PFOA and PFOS were detected in surface soil in select areas of the former Base above human health project screening levels (PSL). PFAS detections above PSLs in soil were limited to the following areas:

- Around Building 680
- West and southwest of Building 13
- Northeast of Building 175
- East of Building 177
- East of Building 80
- West and southwest of Building 608
- At the abandoned rifle range (IR Site 7)

Concentrations of PFOS in select subsurface soil samples above the human health PSLs were identified in five localized areas:

- South of Building 608
- Area surrounding Building 680
- Area of Building 175 and adjacent grassy area
- East and west of Building 177
- Former Fire Training Area (IR Site 5)

The data gaps identified in the Phase 1 RI are being addressed in the ongoing Phase 2 RI.

In 2017, the following actions were included in the TCRA Memorandum for private wells (BRAC PMO East, 2017a):

- Identify locations with private drinking water wells potentially impacted by PFOA/PFOS from the Site and conduct groundwater sampling, laboratory analysis, and data validation for PFOA and PFOS.

- Immediately provide temporary bottled water service for drinking and cooking purposes to locations with validated results above 70 ng/L.

- Provide a permanent drinking water connection to the HWSA municipal water service to locations with validated results above 70 ng/L. The existing well will no longer be used for drinking water, and the borehole will be closed where possible.

- Monitor private drinking water wells with validated results above 40 ng/L on a quarterly basis. The monitoring frequency and duration will be reviewed and adjusted as warranted, based on the results of the RI.

In 2017, the following actions were included in the TCRA Memorandum for municipal wells (BRAC PMO East, 2017b):

- Identify HWSA drinking water wells where combined PFOA and PFOS concentrations (caused by sources at the Site) are above 70 ng/L.

- Provide and maintain a filtration system to reduce PFOA and PFOS levels to or below 70 ng/L at these HWSA drinking water wells. The action will be re-evaluated when the groundwater sources are below 70 ng/L.

In 2018, a removal action for soils containing PFAS exceeding PSLs was included in the soil TCRA memorandum (BRAC PMO East, 2018). The soil TCRA was completed from October 2018 through July 2019, and removed soils containing high concentrations of PFOS and PFOA near Building 608, the area adjacent to Buildings 184 and 183, and Building 175 (AGVIQ, 2020). The action included the excavation and removal of approximately 4,359 tons of PFAS-impacted soil. Soil was transported off-site and disposed of at a permitted EPA-approved landfill. Post-excavation confirmation samples were collected and indicated that concentrations of PFAS were below the cleanup goals of the TCRA but still exceeded the revised EPA RSLs issued in November 2022. The *Removal Action Completion Report* for the soil TCRA was completed in 2020 (AGVIQ, 2020).

In 2025, the Navy issued the Final Action Memorandum for time critical removal action for Navy-funded provision of interim alternative drinking water, connection to municipal supply, and treatment for municipal wells due to PFAS impacts from former NASJRB Willow Grove. The Action Memorandum documented the Navy's decision to provide these actions to help prevent unacceptable health risk related to the consumption of drinking water. The following actions were included:

- Utilize sampling data from municipal supply wells to identify municipal wells impacted by PFAS above the federal MCL from the facility.

- Provide and maintain wellhead treatment systems at two municipal wells without existing treatment systems and assume costs for ongoing maintenance for five previously installed municipal well PFAS treatment systems, which will be reevaluated when the influent groundwater is below the MCL.

- Utilize sampling data from drinking water wells, the conceptual site model, and professional judgement to identity private wells potentially impacted by PFAS from the facility and conduct private well sampling, laboratory analysis, and data validation for PFAS.

- For private well locations with validated results above the DoD PFAS Interim Action Levels, provide an interim alternative water source for drinking and cooking purposes until such time that a permanent connection is available and established (if the location has not received alternative water via previous removal actions) or until the homeowner denies a municipal water connection.

- For private locations with validated results above the DoD PFAS Interim Action Levels, provide private well locations with a permanent drinking water connection to municipal water service. The existing well will no longer be used for drinking water and the borehole will be closed where possible.

2. Current Actions

In addition to the PFAS-related removal actions summarized in the previous section, two on-Base pilot tests implementing ion exchange (IX) groundwater treatment technology were implemented for three wells at the Building 680 area and two wells at the IR Site 5 area to evaluate treatment effectiveness for removal of PFOS and PFOA (Tetra Tech, 2019; Tetra Tech, 2021). The effluent from the Hangar 680 area discharges to Outfall #8 within the Little Neshaminy Creek drainage basin, and IR Site 5 discharges to Outfall #2 within the Pennypack Creek drainage basin. As of 24 June 2024, over 37 million gallons of groundwater have been treated at the Building 680 area, and over 22 million gallons of groundwater have been treated at Site 5. Pilot analytical results have shown that the IX resin treatment technology has effectively reduced PFOA and PFOS compounds in groundwater below the discharge approval for both PFOA and PFOS in the treatment system effluent.

The single-use IX resin has thus far demonstrated very good efficacy in treating PFAS-impacted groundwater in the vicinity of Building 680. Due to the demonstrated efficiency and effectiveness of the resin for PFAS treatment at the site, IX resin was retained as a potential technology for removing PFAS from groundwater in a treatment train design.

C. State and Local Authorities' Role

1. State and Local Actions to Date

The Navy is the lead federal agency at the Base pursuant to Defense Environmental Restoration Program, 10 U.S.C. §§ 2701 through 2710, CERCLA, the NCP, and the delegation of Presidential authority under Executive Orders 12580 and 13016. Pursuant to 10 U.S.C. § 2705, the Navy is required to ensure that state and local officials are given timely opportunity to review and comment on the Navy's proposed response actions. State and local authorities have not undertaken any removal actions at the Site; however, they provide oversight of studies and actions conducted by the Navy. EPA provides oversight of actions and review of documents. Additional support oversight and review are provided by the PADEP. In addition, regulatory oversight of certain actions and review of documents pertaining to groundwater withdrawal and treated groundwater discharge will also fall under the purview of the DRBC.

The local community of Horsham Township is actively engaged and is supportive of the Navy's actions to protect their citizens. The Restoration Advisory Board (RAB)

meets to discuss ongoing cleanup issues. The meetings were held every quarter until December 2023, when the frequency was reduced to every four months. RAB meetings are open to the public and have been held at the Horsham Township Library, the Horsham Community Center, and the Biddle ANG Base Cafeteria. Public notification is provided in advance to specify the location and time of the RAB meetings.

2. Potential for Continued State and Local Response

EPA, PADEP, and the DRBC (when applicable) are expected to continue providing technical advice, environmental regulatory oversight, and assistance until remedial activities at the former NASJRB Willow Grove are complete.

The Navy has an Environmental Services Cooperative Agreement (ESCA) with HWSA to install and maintain treatment for PFOA and PFOS for Navy-impacted municipal wells. This ESCA also extends municipal drinking water connections to locations with private wells impacted by PFOA and PFOS from former Navy operations.

III. THREATS TO PUBLIC HEALTH, WELFARE OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

A. Introduction

In accordance with the NCP, the following threats must be considered when determining the appropriateness of a removal action (40 Code of Federal Regulations [CFR] § 300.415[b][2]):

- Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants, or contaminants.
- Actual or potential contamination of drinking water supplies or sensitive ecosystems.
- Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or bulk storage containers that may pose a threat of release.
- High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate.
- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.
- Threat of fire or explosion.

- The availability of other appropriate federal or state response mechanisms to respond to the release.

- Other situations or factors that may pose threats to public health or welfare or the environment.

B. Threats to Public Health or Welfare

The following threats to Public Health or Welfare from Section III(A) apply to the NTCRA for groundwater:

- Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants, or contaminants.

- Actual or potential contamination of drinking water supplies or sensitive ecosystems.

The NTCRA would reduce human health risks by achieving PFAS mass removal in the immediate vicinities of Building 680 and IR Site 5 at the former NASJRB Willow Grove.The removal action objectives (RAO) will be achieved by removing PFAS-impacted groundwater in the areas of Building 680 and IR Site 5, which will shorten the timeframe of remediation when the full remedy is implemented following the completion of the RI, the feasibility study (FS), the Proposed Plan, the Record of Decision (ROD), and the remedial design.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of PFAS in groundwater from the Site, if not addressed by implementing the response action selected in this Action Memorandum, may present continued imminent and substantial endangerment to public health or welfare. The Navy has determined that this threat can be reduced by undertaking the removal action proposed in this Action Memorandum. The proposed removal action will not allow for unlimited use and unrestricted exposure (UU/UE); rather, post-removal site controls (PRSCs) (e.g., groundwater treatment operation, maintenance and monitoring) will be required. The operation of the groundwater treatment system (GWTS) started under this NTCRA will support the future remedial design of a full groundwater extraction network.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

This section describes the proposed removal action to address the conditions cited in Section III.

A. Proposed Actions

RAOs for the NTCRA for PFAS-impacted groundwater are listed below.

Groundwater RAO: Reduce the current mass of PFAS in on-Base groundwater at and in the immediate vicinities of Building 680 and IR Site 5 by extracting groundwater with the highest concentrations of PFOS and PFOA, which will reduce the migration and mass flux of PFAS from the source areas.

Treatment System RAOs:

- Treat extracted groundwater to meet the discharge criteria established by PADEP under the National Pollutant Discharge Elimination System (NPDES) program. The discharge criteria are set forth in the PADEP Water Quality Management (WQM) Authorization (see Attachment A).

- Size the treatment system to treat 125 percent (494 gpm, rounded to 500 gpm) of the maximum groundwater flow (395 gpm) to be extracted from 29 installed and potential future extraction wells. The additional 25 percent accounts for uncertainties in extraction rates, accommodates for the potential future need to add additional on-Base extraction wells as part of optimization, and/or to potentially incorporate potential increased flow from neighboring Biddle ANG Base remediation efforts. However, the maximum flow rate during the NTCRA will be 400 gpm. The FS will determine the flow rate of the final remedy following completion of the RI. Any increase over 400 gpm will require additional regulatory review.

The NTCRA's anticipated groundwater extraction rate was determined from the likely sustainable well pumping rates observed from the more than 300 monitoring and remediation wells at the Base since the 1980s. The hydraulic effectiveness of the NTCRA to reduce the mass of PFAS in on-Base groundwater will be further evaluated upon system start up and operation. The hydraulic information obtained through the performance of the NTCRA will be applied to the design of the full groundwater extraction network under a future CERCLA remedial action.

The RAOs would be accomplished during the NTCRA by removing PFAS-impacted groundwater in and in the immediate vicinities of Building 680 and IR Site 5. The Navy's preferred removal action consists of Alternatives T3, L5, and D4, which are identified in the EE/CA (Tetra Tech, 2024).

1. Proposed Action Descriptions

Groundwater will be extracted at a maximum combined flow rate of 400 gpm from two distinct groundwater extraction wellfields at Building 680 (and vicinity) and IR Site 5 (and vicinity). Extraction wells will be selected from the 29 existing extraction wells within the two well fields. Additional extraction wells may be added as additional data is gathered as part of ongoing RI activities. Extracted groundwater from each wellfield will be transferred to an approximate 16,000-square-foot GWTS constructed near the North Ramp (Figure 3). Extracted groundwater from IR Site 5

(and vicinity) will be transferred to the proposed treatment facility located near the North Ramp using a manifold building (approximately 265 square feet or larger).

The treatment train is anticipated to transport groundwater from the above-referenced wells pumped to a series of multimedia filters, followed by bag filters, to remove suspended solids and precipitated iron. From the bag filters, the water will flow through granular activated carbon (GAC) vessels in series. These GAC filters will remove non-PFAS organics. The water will then be split into parallel treatment trains to treat PFAS. Each train will consist of IX vessels and a GAC polish vessel in-series. Treated water will be collected in an effluent holding tank and pumped to the regulatory-approved discharge location.

Single-use IX resins have a higher removal capacity and are more effective at treating low concentrations of PFAS. The desired empty bed contact time is approximately 3 minutes per IX resin vessel. The IX resin will be replaced as needed. The spent IX resin will be appropriately disposed of off-site. Refer to Figure 2 for a conceptual process flow diagram developed for cost estimating purposes in the EE/CA. Note that the treatment system is subject to revision during the engineering design. The treatment system will conceptually include two 20,000--pound GAC vessels, two 10,000-pound polishing GAC vessels, and six IX resin vessels, each containing approximately 106 cubic feet of IX resin.

Treated water from the GWTS building will discharge to Park Creek, located northwest of the former Base and adjacent to Keith Valley Road, using a new gravity piping system. The new piping system will convey treated water from the GWTS building and run northwest along the new road that is proposed in the Site Redevelopment Plan. The new piping system will be constructed under Keith Valley Road and will discharge to Park Creek. The water level in Park Creek will be monitored for flood conditions, which will signal a preventative shutdown to the GWTS. Refer to Figures 2 through 4, respectively, for further details on the above proposed groundwater withdrawal, treatment, and discharge remedial system.

Project activities will be performed by technically qualified personnel working under an approved removal action work plan, which would include details of the removal action design, a health and safety plan, and erosion and sediment control plans.

2. Contribution of Remedial Performance

The proposed actions will contribute to the efficient removal of PFAS-impacted groundwater at the former Base. A long-term remedial action will follow this NTCRA. However, this NTCRA will reduce the PFAS-impacted groundwater in source areas while the RI, FS, Proposed Plan, and ROD are being completed.

3. Description of Alternative Technologies

Three aspects of the removal alternative were considered individually, with combined alternatives generated for each aspect of the removal system:

- Four treatment technology alternatives ("T" alternatives), including a "No Action" alternative.
- Five building location alternatives ("L" alternatives) for pipe routing, treatment system(s), and for four of the five alternatives' pump stations or manifold buildings, as the pipe routings for the alternative may require.
- Five discharge location alternatives ("D" alternatives).

Based on the above, 100 alternative combinations were considered, with the best overall grouping of individual treatment, location, and discharge alternatives becoming the recommended removal action alternative set.

a. Treatment Technology Alternatives

Based on the screening of technologies in the EE/CA, the following removal action alternatives were developed for the PFAS-impacted groundwater treatment at former NASJRB Willow Grove:

- Alternative T1 – No action.
- Alternative T2 – Treatment with GAC.
- Alternative T3 – Treatment system using GAC and single-use IX resin.
- Alternative T4 – Treatment system using GAC and regenerable IX resin.

b. Building Location Alternatives

Based on the building location options retained during the screening process, the following five location alternatives were developed:

- Alternative L1 – Two separate GWTS buildings to be constructed near Building 680 and at IR Site 5.
- Alternative L2 – One GWTS building constructed at IR Site 5 and one pump station building constructed near Building 680.
- Alternative L3 – One GWTS building constructed near Building 680 and one pump station building constructed at IR Site 5.

- Alternative L4 – One GWTS inside existing Building 177 and one pump station building constructed near Building 680.

- Alternative L5 – One GWTS building constructed at the North Ramp and one manifold building constructed at IR Site 5.

c. Discharge Location Alternatives

Based on the discharge location options retained during the screening process, the following five discharge location alternatives were developed:

- Alternative D1: Discharge to the existing recreational basin near existing Building 177.

- Alternative D2: Discharge to the existing storm sewer system (Outfall #4).

- Alternative D3: Reinjection into the groundwater system.

- Alternative D4: Discharge to Park Creek using a new piping system.

- Alternative D5: Discharge to two existing storm sewer systems (Outfall #3 and Outfall #8).

4. Engineering Evaluation and Cost Analysis

The EE/CA was performed in accordance with current EPA and Navy guidance documents for a NTCRA under the CERCLA framework (EPA, 1993). The evaluation considered factors associated with effectiveness, implementability, and cost when assessing the most appropriate action to meet the RAOs for the interim treatment of groundwater in the Building 680 and IR Site 5 areas at the former NASJRB Willow Grove. The Draft EE/CA was submitted to the EPA and PADEP for review and comment in February 2023. The EE/CA was finalized and approved by EPA and PADEP in July 2024 (Tetra Tech, 2024). Copies of the EE/CA were made available to the public for the required 45-day public comment period starting on July 22, 2024. An advertisement (i.e., public notice) announcing the 45-day public comment period was published in the Intelligencer newspaper on July 17 and July 24, 2024 (Attachment B). The public comment period ended on September 5, 2024, and comments were received. A summary of the public comments and corresponding responses are provided in Attachment B.

5. Applicable or Relevant and Appropriate Requirements

The proposed removal action is being conducted in accordance with CERCLA. The NTCRA will attain federal and state applicable or relevant and appropriate requirements (ARARs) identified and evaluated by the Navy to the extent practicable

and required by law. The evaluation of federal and state ARARs for the NTCRA are presented in Tables 1 through 3.

Two factors are applied to determine whether the identification and attainment of ARARs is practicable (EPA, 1988): (1) the exigencies of the situation and (2) the scope of the removal action to be taken. Because on-Site CERCLA response actions do not require permitting, only substantive requirements are considered as possible ARARs.

Chemical-specific ARARs address human health or ecological risks at the Site by establishing numerical values to define the treatment and discharge standards or remedial action and cleanup levels. No chemical-specific ARARs have been identified for the proposed removal action. Location-specific ARARs protect unique or sensitive areas that could potentially be damaged based on the removal actions in place at the Site. Action-specific ARARs are activity- or technology-based activities that involve the design or use of certain equipment or regulate discrete actions. Action-specific ARARs control or restrict hazardous substance-related or pollutant-related activities. In addition to ARARs, other regulations and guidance may be classified as “To Be Considered” (TBC) guidelines/criteria. TBCs are non-promulgated, non-enforceable guidelines or criteria that may aid in the development and evaluation of removal action alternatives.

6. Project Schedule

Per CERCLA Section 104(c), there is no time restriction for implementing the removal action at former NASJRB Willow Grove since the Navy is funding the removal activity (CRS, 2012). Since this removal action has been designated non-time-critical, the start date is dependent on the completion of public review and subsequent action memoranda, the availability of adequate funding and contracting capacity, and the development and approval of the removal action work plan. Once the planning and approval process is complete, the removal action can be implemented. A project schedule is presented in Appendix C of the EE/CA (Tetra Tech, 2024).

Aside from the previously mentioned dependence upon timely regulatory approval of this Action Memorandum and adequate funding and contracting availability, there are no other anticipated weather-related, administrative, or material availability restrictions that are expected to impact the removal schedule.

At this time, the removal action is expected to be implemented in 2026.

B. Estimated Costs

The total estimated cost developed for the proposed removal action includes both capital costs and annual operations and maintenance (O&M) and monitoring costs

(Attachment C). Capital costs include both direct and indirect costs expected at the time of removal action implementation. Annual O&M costs are the PRSCs required to ensure the continued effectiveness of the removal action. The estimated capital cost is approximately $10,567,000. The annual O&M costs would be approximately $1,244,000 in Year 2023 dollars. Over an estimated 30-year period, the net present worth of the total cost for Alternatives T3, L5, and D4 is estimated to be approximately $44,862,000 based on a discount rate of 0.5 percent (OMB, 2022); however, the full remedy will be in place before this time, so much of the future costs will be attributed to the to-be-selected remedy.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If the removal action is not carried out, PFAS- impacted groundwater at IR Site 5 and the surrounding areas, along with Building 680 and its surroundings, will continue to spread and exacerbate the PFAS impacts of both on-Base and off- Base groundwater and nearby private and public drinking water sources.

VII. PUBLIC INVOLVEMENT

In compliance with 40 CFR 300.415(n), copies of the EE/CA were made available to the public for the required 45-day public comment period. A copy of the public notice is provided in Attachment B. Pertinent documents from the Administrative Record File will be made available for public review at the following Public Information Repository:

View online at:

https://administrative-records.navfac.navy.mil/?PXMQQUXGO3UY6G47WO

or https://www.horshamlibrary.org/willow-grove-nas

View a hard copy at:

Horsham Township Library
435 Babylon Road
Horsham, Pennsylvania 19044
Phone: (215) 443-2609

VIII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues identified at this time.

IX. ENFORCEMENT

This NTCRA is being undertaken voluntarily by the Navy in accordance with CERCLA and the FFA for the Base. The regulatory agencies are anticipated to remain in an oversight role for the duration of the NTCRA, reviewing the removal action work plan and sampling results to ensure compliance with regulations under CERCLA.

X. RECOMMENDATION

This Action Memorandum documents (for the Administrative Record) the decision made by the Navy to undertake an NTCRA for the implementation of a groundwater extraction and treatment system for PFAS-impacted groundwater at former NASJRB Willow Grove. This decision has been developed in accordance with CERCLA, as amended, and is consistent with the NCP. The removal action alternative combination recommended in the EE/CA is Alternatives T3, L5, and D4:

- Alternative T3 – Treatment system using GAC and single-use IX resin.
- Alternative L5 – One GWTS building constructed at the North Ramp and one manifold building constructed near IR Site 5.
- Alternative D4 – Discharge to Park Creek using a new piping system.

This decision is based on the Administrative Record for the Site. Conditions at the Site meet the removal action criteria as defined in the NCP 40 CFR 300.415(b)(2). Therefore, the Navy recommends the implementation of the proposed action.

XI. APPROVAL

This decision document represents the selected removal action to reduce PFAS concentrations in groundwater at the Building 680 and IR Site 5 areas of former NASJRB Willow Grove. This decision was developed in accordance with CERCLA, as amended, and is consistent with the NCP and the FFA. This decision is based on the Administrative Record for the Site.

Approval:

HARRIS.JONATHAN.IAN.1598285906 Digitally signed by HARRIS.JONATHAN.IAN.1598285906 Date: 2025.11.14 08:28:56 -05'00'

Date: 11/14/2025

Jonathan Harris
BRAC Environmental Coordinator
BRAC Program Management Office East

XII. REFERENCES

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TABLES

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Table 1: Assessment of Chemical-Specific ARARs and TBCs for Groundwater Alternatives

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
There are no Federal chemical-specific ARARs or TBCs.				
State				
There are no State chemical-specific ARARs or TBCs.				

Table 2: Assessment of Location-Specific ARARs and TBCs for Groundwater Alternatives

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
Delaware River Basin Commission - Ground Water Protection Area: Pennsylvania	18 Code of Federal Regulations (CFR), 430.7, 430.9, 430.13(i)(3)(i), 430.15(b)	Relevant and appropriate	Governs the withdrawal of water and the operation of groundwater wells withdrawing water from the Delaware River Basin.	Extraction of groundwater for treatment will meet the substantive requirements of these regulations.
Migratory Bird Treaty Act	16 United States Code 703-712	Relevant and appropriate	Provides protection for migrating birds, nests, and eggs. Makes it illegal for people to “take” migratory birds, their eggs, feathers, or nests.	Appropriate actions will be taken during removal action (such as treatment building construction) to ensure that no migratory birds or nests are affected. Site surveys may be conducted prior to beginning removal activities to determine if any birds and nesting areas are present. Substantive portions only.
State				
Flood Plain Management	25 Pa. Code § 106.31 and .32	Relevant and Appropriate	Sets forth provisions for the regulation of obstructions located in the 100-year floodplain as delineated by FEMA Flood Hazard Boundary Maps. The content of the cited sections are: .31 (Hydraulic capacity) and 106.32 (Placement of drainage structures)	Alternative D4 includes construction of new pressurized piping that may be constructed within the 100-year floodplain of Park Creek. Pertinent only to structures that would be obstructions. Substantive portion only.

Table 3: Assessment of Action-Specific ARARs and TBCs for Groundwater Alternatives

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Federal				
CWA National Recommended Water Quality Criteria (NRWQC)	Clean Water Act Section 304(a)(1)	Relevant and Appropriate	Federal NRWQC are health-based and ecologically-based criteria developed for carcinogenic and non-carcinogenic compounds.	These standards will be used to develop surface water discharge limitations for ex situ groundwater treatment system discharge.
State				
Water Resources - General Provisions	25 Pa. Code § 91.34(a)	Applicable	Persons engaged in an activity which includes the impoundment, transportation, storage, application or disposal etc. of pollutants shall take necessary measures to prevent the substances from directly or indirectly reaching waters of this Commonwealth.	Alternative D4 in conjunction with the treatment process discharge to surface water, and are subject to effluent limitations.
National Pollutant Discharge Elimination System (NPDES) Permitting, Monitoring and Compliance	25 Pa. Code § 92a.41, .44, and .61	Relevant and appropriate	Establishes criteria for the content of NPDES applications, effluent standards, monitoring requirements, standard permit conditions. The content of the cited sections are: .41 (Conditions applicable to all permits, .44 (Establishing limitations, standards, and other permit conditions), .61 (Monitoring)	Alternative D4 in conjunction with the treatment process discharge to surface water, and are subject to effluent limitations and monitoring. Substantive portions only.
Erosion and Sediment Control	25 Pa, Code § 102.4(b) and 102.11	Applicable	Sets forth provisions that impose requirements on all earth disturbance activities per Pennsylvania's Erosion And Sediment Pollution Control Program Manual. The content of the cited sections are: 102.4(b) (Erosion and sediment control requirements) and 102.11 (General requirements)	Sediment and erosion control features will need to be implemented before start of any intrusive earth disturbance activities. Substantive portions only
Residual Waste Management, Storage and Transportation of Residual Waste	25 Pa. Code § 299.111 through .116, and .121	Relevant and Appropriate	Specifies general procedures and rules for the storage of residual waste.	Alternative T3 may generate residual waste in the form of spent filter media that will require storage. Substantive portions only.

Table 3: Assessment of Action-Specific ARARs and TBCs for Groundwater Alternatives

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Management of Fill Policy, January 16, 2021	Document Number: 258-2182-773	To be Considered	Provides PADEP's procedures for determining whether material is clean fill or regulated fill and their acceptance and operation criteria.	Fill that is used for backfilling in the course of the implementation of the Removal Action should need to meet the acceptance and operation standards for clean fill or regulated fill as defined in this document. Substantive portions only.
Standards for Contaminants [Air]	25 Pa. Code § 123.1 and 123.2	Applicable	Fugitive dust emissions generated during removal action activities that involve excavation will need to be controlled (123.1 & 123.2).	Excavation to install new piping to convey water may be necessary to implement Alternative D4. Excavation will also be necessary for construction of treatment system buildings. Substantive portions only
Dam Safety and Waterway Management	25 Pa. Code § 105.444	Relevant and appropriate	Describes the contents of general permits for dams, water obstructions, and encroachments.	The outfall for Alternative D4 would need to meet the substantive requirements of a PADEP general permit GP-4, Intake and Outfall Structures and may require additional consultation with the U.S. Army Corps of Engineers depending on the size and design of the discharge pipe.
Policy for Pennsylvania Natural Diversity Inventory ("PNDI") Coordination During Permit Review and Evaluation, May 25, 2013	Document Number: 021-0200-001, Section 3	To be Considered	The PNDI search can be used to identify any habitats or species of concern in an area.	The PNDI search should be performed to identify any habitats or species of concern that may be impacted by the Removal Action. Substantive portions only.
Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers (PADEP, 2008	PADEP document 391-2000-014, Section V.D	To be Considered	Describes discharge flow rate and velocity requirements to surface water and storm sewers	Alternative D4 in conjunction with the treatment process discharge to surface water, and are subject to discharge requirements. Substantive portions only.

FIGURES

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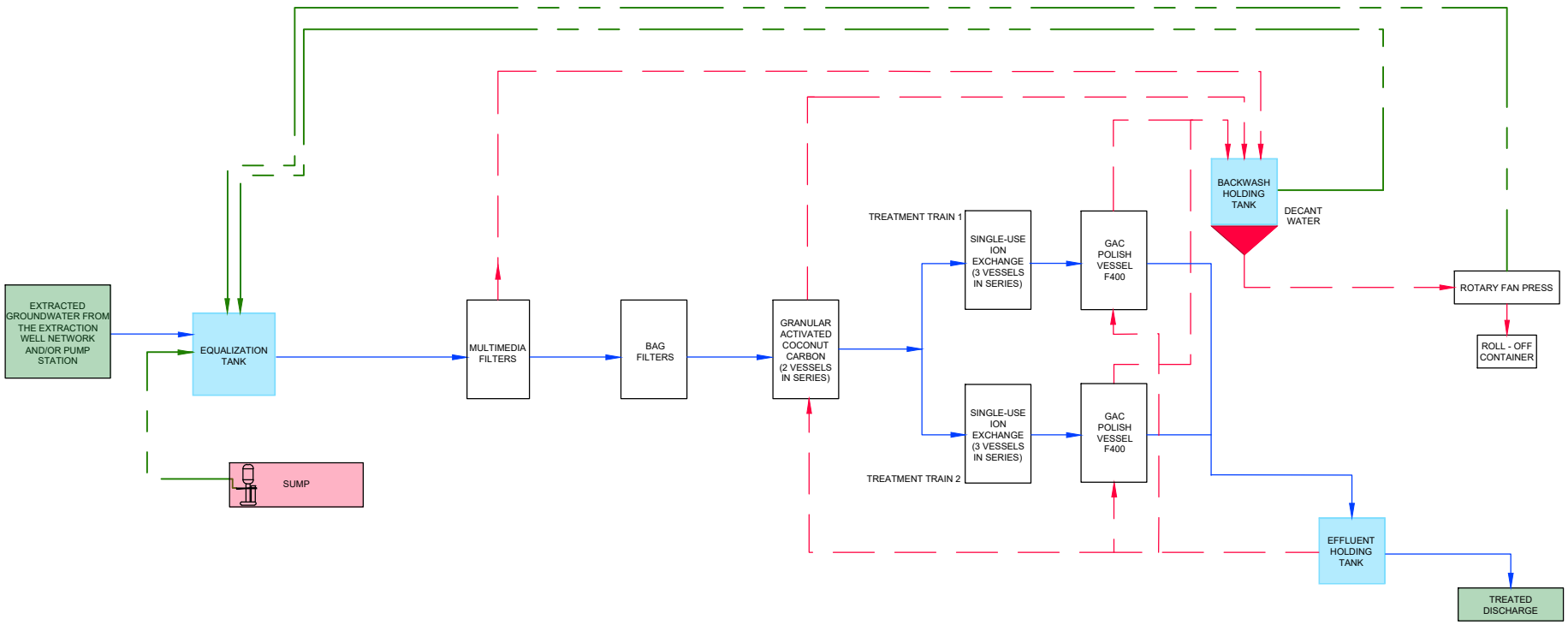
LEGEND

PRIMARY PROCESS

SECONDARY PROCESS

BACKWASH PROCESS

SUMP PUMP



NOTE:
CONCEPTUAL DESIGN FOR COST ESTIMATING PURPOSES, SUBJECT TO REVISION

NAVFAC

ALTERNATIVE T3 PROCESS FLOW DIAGRAM
BUILDING 680 AND SITE 5 PFAS
GROUNDWATER EXTRACTION & TREATMENT SYSTEM
FORMER NASJRB WILLOW GROVE
HORSHAM TOWNSHIP, PENNSYLVANIA

SCALE	N.T.S
FILE	112G08005PF01
REV	0
DATE	2/27/23
FIGURE NUMBER	FIGURE 2

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ATTACHMENT A
PADEP WATER QUALITY MANAGEMENT AUTHORIZATION

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Pennsylvania
Department of
Environmental Protection

October 21, 2024

Jonathan Harris
Department of the Navy
4911 S Broad Street
Philadelphia, PA 19112-1303

Re: Final WQM Authorization
Willow Grove NASJRB GWETS
WQM Authorization No. 4624203
Authorization ID No. 1490205
Horsham Township, Montgomery County

Dear Permittee:

In accordance with Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the Department of Environmental Protection (DEP) is providing you with its Water Quality legally applicable or relevant and appropriate requirements, criteria, standards and limitations (ARARs) for the above-referenced remedial action, which are set forth in the enclosed Water Quality Management (WQM) Authorization. Please read the document carefully.

Please note that the ARARs should be reevaluated by DEP every five years. To assist DEP in this reevaluation, please submit an NPDES permit application for industrial waste facilities (3800-PM-BCW0008b) by the date specified on page 1 of the WQM Authorization.

The ARARs require that you use the Department of Environmental Protection's (DEP's) electronic Discharge Monitoring Report (eDMR) system to report the results of self-monitoring activities. The information you must submit within 30 days to register for use of the eDMR system is available at www.dep.pa.gov/edmr. DEP has also enclosed paper DMR templates and DMR instructions with the ARARs. It is recommended that you retain the DMR templates in the event you are unable to submit DMRs electronically through the eDMR system.

Also enclosed is a Supplemental Form Inventory, which identifies the forms that are attached to the ARARs and must be submitted as attachments to eDMR reports, as applicable (see individual form instructions). The submission of other supplemental forms may be required in accordance with the ARARs. We encourage you to use the spreadsheet versions of supplemental forms that contain appropriate validation and DEP-approved calculations.

We would like to bring DEP's eNOTICE service to your attention. eNOTICE is a subscription service that provides options to receive notifications of DEP's activities such as the receipt of permit applications, comment periods for guidance and regulations, and stream redesignation evaluations. To sign up for an account, visit DEP's website (www.dep.pa.gov) and select Data and Tools – Tools – eNOTICE.

If you have any questions, please contact Reza H. Chowdhury at 484.250.5197 or email at rchowdhury@pa.gov.

Sincerely,

Thomas L. Magge
Environmental Program Manager
Clean Water Program

Enclosures

cc: Tetra Tech
Horsham Township (Transmittal Letter only)
Montgomery County Health Department (Transmittal Letter only)
DEP SERO ECB
Office of Regional Counsel
Operations Section
File
RA-EPNPDES_Permits@pa.gov

Pennsylvania
Department of
Environmental Protection

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

WATER QUALITY
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
Relating to 25 Pa. Code Chapters 91-96

WQM NO: 4624203 A-1

In accordance with Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the provisions of Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 *et seq.*

Department of the Navy
4911 S Broad Street
Philadelphia, PA 19112-1303

is prescribed the following applicable or relevant and appropriate requirements, criteria, standards and limitations (ARARs) for a facility known as **Willow Grove NASJRB GWETS**, located in **Horsham Township, Montgomery County**, to **Park Creek (WWF, MF)** in Watershed(s) **2-F**

THESE ARARS WILL BECOME EFFECTIVE ON **February 1, 2025**

THESE ARARS MAY BE REVIEWED ON **October 31, 2029**

If there is a conflict between an application, its supporting documents and/or amendments and the terms and conditions these ARARs, these terms and conditions shall apply.

DATE ISSUED October 21, 2024

DATE AMENDED January 28, 2025

ISSUED BY Thomas L. Magge

Thomas L. Magge

Environmental Program Manager
Southeast Regional Office

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS

I. A. For Outfall 020 **, Latitude** 40º 12' 54.51" **, Longitude** -75º 9' 40.67" **, River Mile Index** 1.18 **, Stream Code** 02661

Receiving Waters: Park Creek (WWF, MF)

Type of Effluent: Treated Groundwater

Based on the anticipated wastewater characteristics and flows, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	XXX	XXX	XXX	XXX	XXX	Continuous	Recorded
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/week	Grab
Total Suspended Solids	XXX	XXX	XXX	30.0	XXX	60	1/week	Grab
Aluminum, Total	XXX	XXX	XXX	Report Daily Max	XXX	XXX	1/week	Grab
PFOA (ug/L) (3), (4)	XXX	XXX	XXX	XXX	XXX	Report	1/week	Grab
PFOS (ug/L) (3), (4)	XXX	XXX	XXX	XXX	XXX	Report	1/week	Grab
Total PFOA and PFOS (ug/L) (3)	XXX	XXX	XXX	0.07*	Report	XXX	1/month	Calculation

* The effluent limitation for Total PFOA and PFOS will be modified in the event of changes to EPA's Health Advisory Level (HAL) or the promulgation of other applicable standards, such as Maximum Contaminant Levels (MCLs) under either the Federal Safe Drinking Water Act or the Pennsylvania Safe Drinking Water Act.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

after last treatment unit

PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS (Continued)

Additional ARARs

The following may not be discharged:

1. Floating solids, scum, sheen or substances that result in observed deposits in the receiving water.

2. Oil and grease in amounts that cause a film or sheen upon or discoloration of the waters of this Commonwealth or adjoining shoreline, or that exceed 15 mg/l as a daily average or 30 mg/l at any time (or lesser amounts if specified in these ARARs). (25 Pa. Code § 95.2(2))

3. Substances in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life. (25 Pa Code § 93.6(a))

4. Foam or substances that produce an observed change in the color, taste, odor or turbidity of the receiving water, unless those conditions are otherwise controlled through effluent limitations or other requirements in these ARARs. For the purpose of determining compliance with this condition, DEP will compare conditions in the receiving water upstream of the discharge to conditions in the receiving water approximately 100 feet downstream of the discharge to determine if there is an observable change in the receiving water.

Footnotes

(1) When sampling to determine compliance with mass effluent limitations, the discharge flow at the time of sampling must be measured and recorded.

(2) This is the minimum number of sampling events required. Dischargers are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events.

(3) EPA Method 537.1 or other DEP/EPA approved methods can be used to analyze for PFOA and PFOS. Total PFOA and PFOS shall be reported as the sum of the results for PFOA and PFOS.

(4) The Department of Navy shall monitor for PFOA and PFOS on weekly frequency at the discharge from the final treatment unit of the treatment train or at the Outfall 020 when any of the sample results exceed PFOA concentration of 0.010 ppb (ug/l) or PFOS concentration of 0.014 ppb (ug/l). The Department of Navy shall investigate the filter media performance and replace the filter media on all affected vessels in the treatment train. These concentrations are not effluent limitations.

Supplemental Information

The effluent limitations for Outfall 020 were determined using an effluent discharge rate of 0.72 MGD.

II. DEFINITIONS

At Outfall (XXX) means a sampling location in outfall line XXX below the last point at which wastes are added to outfall line (XXX), or where otherwise specified.

Average refers to the use of an arithmetic mean, unless otherwise specified in these ARARs.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce the pollutant loading to surface waters of the Commonwealth. The term also includes treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. The term includes activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim, and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during and after earth disturbance activities.

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Calendar Week is defined as the seven consecutive days from Sunday through Saturday, unless the discharger has been given permission by DEP to provide weekly data as Monday through Friday based on showing excellent performance of the facility and a history of compliance. In cases when the week falls in two separate months, the month with the most days in that week shall be the month for reporting

Chemical Additive means a chemical product (including products of disassociation and degradation, collectively “products”) introduced into a waste stream that is used for cleaning, disinfecting, or maintenance and which may be detected in effluent discharged to waters of the Commonwealth. The term generally excludes chemicals used for neutralization of waste streams, the production of goods, and treatment of wastewater.

Composite Sample (for all except GC/MS volatile organic analysis) means a combination of individual samples (at least eight for a 24-hour period or four for an 8-hour period) of at least 100 milliliters (mL) each obtained at spaced time intervals during the compositing period. The composite must be flow-proportional; either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval is proportional to the flow rates over the time period used to produce the composite.

Composite Sample (for GC/MS volatile organic analysis) consists of at least four aliquots or grab samples collected during the sampling event (not necessarily flow proportioned). A separate analysis should be performed for each sample and the results should be averaged.

Daily Average Temperature means the average of all temperature measurements made, or the mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar day or during the operating day if flows are of a shorter duration.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Daily Maximum Discharge Limitation means the highest allowable "daily discharge."

Discharge Monitoring Report (DMR) means the DEP supplied form(s) for the reporting of self-monitoring results by the discharger.

Estimated Flow means any method of liquid volume measurement based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes.

Geometric Mean means the average of a set of n sample results given by the nth root of their product.

Grab Sample means an individual sample of at least 100 mL collected at a randomly selected time over a period not to exceed 15 minutes.

Immersion Stabilization (i-s) means a calibrated device is immersed in the wastewater until the reading is stabilized.

Instantaneous Maximum Effluent Limitation means the highest allowable discharge of a concentration or mass of a substance at any one time as measured by a grab sample.

Measured Flow means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.

Monthly Average Discharge Limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Severe Property Damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

Stormwater means the runoff from precipitation, snow melt runoff, and surface runoff and drainage.

Stormwater Associated With Industrial Activity means the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant.

Total Dissolved Solids means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136.

Toxic Pollutant means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains may, on the basis of information available to DEP cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformations in these organisms or their offspring.

III. SELF-MONITORING, REPORTING AND RECORDKEEPING

A. Representative Sampling

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Representative sampling includes the collection of samples, where possible, during periods of adverse weather, changes in treatment plant performance and changes in treatment plant loading. If possible, effluent samples must be collected where the effluent is well mixed near the center of the discharge conveyance and at the approximate mid-depth point, where the turbulence is at a maximum and the settlement of solids is minimized.

2. Recording of Results

   For each measurement or sample taken pursuant to the requirements of these ARARs, the discharger shall record the following information:

   a. The exact place, date and time of sampling or measurements.
   b. The person(s) who performed the sampling or measurements.
   c. The date(s) the analyses were performed.
   d. The person(s) who performed the analyses.
   e. The analytical techniques or methods used; and the associated detection level.
   f. The results of such analyses.

3. Test Procedures

   a. Facilities that test or analyze environmental samples used to demonstrate compliance with these ARARs shall be in compliance with laboratory accreditation requirements of Act 90 of 2002 (27 Pa. C.S. §§ 4101-4113) and 25 Pa. Code Chapter 252, relating to environmental laboratory accreditation.

   b. Test procedures (methods) for the analysis of pollutants or pollutant parameters shall be those approved under 40 CFR Part 136 or required under 40 CFR Chapter I, Subchapters N or O, unless the method is specified in these ARARs or has been otherwise approved in writing by DEP.

   c. Test procedures (methods) for the analysis of pollutants or pollutant parameters shall be sufficiently sensitive. A method is sufficiently sensitive when 1) the method minimum level is at or below the level of the effluent limit established in the ARARs for the measured pollutant or pollutant parameter; or 2) the method has the lowest minimum level of the analytical methods approved under 40 CFR Part 136 or required under 40 CFR Chapter I, Subchapters N or O, for the measured pollutant or pollutant parameter; or 3) the method is specified in these ARARs or has been otherwise approved in writing by DEP for the measured pollutant or pollutant parameter. Dischargers have the option of providing matrix or sample-specific minimum levels rather than the published levels.

4. Quality/Assurance/Control

   In an effort to assure accurate self-monitoring analyses results:

   a. The discharger, or its designated laboratory, shall participate in the periodic scheduled quality assurance inspections conducted by DEP.

   b. The discharger, or its designated laboratory, shall develop and implement a program to assure the quality and accurateness of the analyses performed to satisfy the requirements of these ARARs, in accordance with 40 CFR Part 136.

B. Reporting of Monitoring Results

1. The discharger shall effectively monitor the operation and efficiency of all wastewater treatment and control facilities, and the quantity and quality of the discharge(s) as specified in these ARARs.

2. The discharger shall use DEP's electronic Discharge Monitoring Report (eDMR) system to report the results of compliance monitoring under these ARARs (see www.dep.pa.gov/edmr). Dischargers that are not using the eDMR system as of the effective date of these ARARs shall submit the necessary registration and trading partner agreement forms to DEP's Bureau of Clean Water (BCW) within 30 days of the effective date of these ARARs and begin using the eDMR system when notified by DEP BCW to do so.

3. Submission of a physical (paper) copy of a Discharge Monitoring Report (DMR) is acceptable under the following circumstances:

   a. For a discharger that is not yet using the eDMR system, the discharger shall submit a physical copy of a DMR to the DEP regional office that issued the permit during the interim period between the submission of registration and trading partner agreement forms to DEP and DEP's notification to begin using the eDMR system.

   b. For any discharger, as a contingency a physical DMR may be mailed to the DEP regional office that issued the ARARs if there are technological malfunction(s) that prevent the successful submission of a DMR through the eDMR system. In such situations, the discharger shall submit the DMR through the eDMR system within 5 days following remedy of the malfunction(s).

4. DMRs must be completed in accordance with DEP's published DMR instructions (3800-FM-BCW0463). DMRs must be received by DEP no later than 28 days following the end of the monitoring period. DMRs are based on calendar reporting periods and must be received by DEP in accordance with the following schedule:

   - Monthly DMRs must be received within 28 days following the end of each calendar month.
   - Quarterly DMRs must be received within 28 days following the end of each calendar quarter, i.e., January 28, April 28, July 28, and October 28.
   - Semiannual DMRs must be received within 28 days following the end of each calendar semiannual period, i.e., January 28 and July 28.
   - Annual DMRs must be received by January 28, unless Part C of these ARARs requires otherwise.

   The discharger shall complete all Supplemental Reporting forms (Supplemental DMRs) attached to these ARARs, or an approved equivalent, and submit the signed, completed forms as attachments to the DMR, through DEP's eDMR system. DEP's Supplemental Laboratory Accreditation Form (3800-FM-BCW0189) must be completed and submitted to DEP with the first DMR following issuance of these ARARs, and anytime thereafter when changes to laboratories or methods occur.

5. The completed DMR Form shall be signed and certified by either of the following applicable persons:

   - For a corporation - by a principal executive officer of at least the level of vice president, or an authorized representative, if the representative is responsible for the overall operation of the facility from which the discharge described in the application originates.
   - For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
   - For a municipality, state, federal or other public agency - by a principal executive officer or ranking elected official.

   If signed by a person other than the above and for co-dischargers, written notification of delegation of DMR signatory authority must be submitted to DEP in advance of or along with the relevant DMR form.

6. If the discharger monitors any pollutant at monitoring points as designated by these ARARs, using analytical methods described in Part A III.A.4. herein, more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR.

C. Reporting Requirements

1. Planned Changes to Waste Stream – The discharger shall provide notice to DEP as soon as possible but no later than 45 days prior to any planned changes in the volume or pollutant concentration of its influent

waste stream, as specified in paragraphs 2.a. and 2.b., below. Notice shall be provided on the "Planned Changes to Waste Stream" Supplemental Report (3800-FM-BCW0482), available on DEP's website. The discharger shall provide information on the quality and quantity of waste introduced into the facility, and any anticipated impact of the change on the quantity or quality of effluent to be discharged from the facility.

a. Introduction of New Pollutants

New pollutants are defined as parameters that meet all of the following criteria:

(i) Were not previously detected in the facilities' influent waste stream

(ii) Have not been approved to be included in the discharger's influent waste stream by DEP in writing.

The discharger shall provide notification of the introduction of new pollutants in accordance with paragraph 2 above. The discharger may not authorize the introduction of new pollutants until the discharger receives DEP's written approval.

b. Increased Loading of Approved Pollutants

Approved pollutants are defined as parameters that meet one or more of the following criteria:

(i) Were previously detected in the facilities' influent waste stream discharger

(ii) Have been approved to be included in the discharger's influent waste stream by DEP in writing; or

(iii) Have an effluent limitation or monitoring requirement in these ARARs.

The discharger shall provide notification of the introduction of increased influent loading (lbs/day) of approved pollutants in accordance with paragraph 2 above when (1) the cumulative increase in influent loading (lbs/day) exceeds 20% of the maximum loading reported or (2) may cause an exceedance in the effluent of Effluent Limitation Guidelines (ELGs) or limitations in Part A of these ARARs, or (3) may cause interference or pass through at the facility (as defined at 40 CFR 403.3), or (4) may cause exceedances of the applicable water quality standards in the receiving stream. Unless specified otherwise in these ARARs, if DEP does not respond to the notification within 30 days of its receipt, the discharger may proceed with the increase in loading. The acceptance of increased loading of approved pollutants may not result in an exceedance of ELGs or effluent limitations and may not cause exceedances of the applicable water quality standards in the receiving stream.

c. Use of New Chemical Additives

The discharger should report the proposed use of any new chemical additives not previously reported to the Department before introducing the chemical additive. The following information should be submitted:

(i) Trade name(s) of chemical.

(ii) Material Safety Data Sheet (MSDS) or other available information on mammalian or aquatic toxicological effects.

(iii) Bioassay data including a 48-hour or 96-hour LC_{50} value on the whole product.

(iv) Proposed average and maximum chemical usage rates in lbs/day.

(v) The expected concentration of the product at the final outfall.

(vi) The product density for liquids (lbs/gal) used to convert usage rate (gpd) to in-system concentrations (mg/l).

2. Unanticipated Potential Pollution Reporting

   a. Immediate Reporting - The discharger shall immediately report any incident causing or threatening pollution.

      (i) If, because of an accident, other activity or incident a toxic substance or another substance which would endanger users downstream from the discharge, or would otherwise result in pollution or create a danger of pollution or would damage property, the discharger shall immediately notify DEP by telephone of the location and nature of the danger. Oral notification to DEP is required as soon as possible, but no later than 4 hours after the discharger becomes aware of the incident causing or threatening pollution.

      (ii) If reasonably possible to do so, the discharger shall immediately notify downstream users of the waters of the Commonwealth to which the substance was discharged. Such notice shall include the location and nature of the danger.

      (iii) The discharger shall immediately take or cause to be taken steps necessary to prevent injury to property and downstream users of the waters from pollution or a danger of pollution and, in addition, within 15 days from the incident, shall remove the residual substances contained thereon or therein from the ground and from the affected waters of this Commonwealth to the extent required by applicable law.

   b. 24 Hour Reporting - The discharger shall orally report any noncompliance with these ARARs which may endanger health or the environment within 24 hours from the time the discharger becomes aware of the circumstances. The following shall be included as information which must be reported within 24 hours under this paragraph:

      (1) Any unanticipated bypass which exceeds any effluent limitation in these ARARs;

      (2) Any upset which exceeds any effluent limitation in these ARARs;

PART B

I. MANAGEMENT REQUIREMENTS

A. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the terms and conditions of these ARARs. Proper operation and maintenance includes, but is not limited to, adequate laboratory controls including appropriate quality assurance procedures. This provision also includes the operation of backup or auxiliary facilities or similar systems that are installed by the discharger, only when necessary to achieve compliance with the terms and conditions of these ARARs.

B. Duty to Mitigate

The discharger shall take all reasonable steps to minimize or prevent any discharge, sludge use or disposal in violation of these ARARs that has a reasonable likelihood of adversely affecting human health or the environment.

C. Bypassing

1. Bypassing Not Exceeding Effluent Limitations - The discharger may allow a bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions in paragraph two.

2. Other Bypassing - In all other situations, bypassing is prohibited unless:

   a. A bypass is unavoidable to prevent loss of life, personal injury or "severe property damage."

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance.

PART C

I. ADDITIONAL PERFORMANCE CRITERIA

A. Collected screenings, slurries, sludges, and other solids shall be handled, recycled and/or disposed of in compliance with the Solid Waste Management Act (35 P.S. §§ 6018.101 – 6018.1003), 25 Pa. Code Chapters 287, 288, 289, 291, 295, 297, and 299 (relating to requirements for landfilling, impoundments, land application, composting, processing, and storage of residual waste), Chapters 261a, 262a, 263a, and 270a (related to identification of hazardous waste, requirements for generators and transporters, and hazardous waste, requirements for generators and transporters, and hazardous waste permit programs), federal regulation 40 CFR Part 257, The Clean Streams Law, and the Federal Clean Water Act and its amendments. Screenings collected at intake structures shall be collected and managed and not be returned to the receiving waters.

B. Sludges and other solids shall be handled and disposed of in compliance with 25 Pa. Code, Chapters 262, 263, and 264 (related to permits and requirements for landfilling and storage of hazardous sludge) and applicable federal regulations, the Federal Clean Water Act, RCRA and their amendments.

C. There shall be no discharge of stripper tower cleaning wastewaters to waters of the Commonwealth. Cleaning wastewaters shall be discharged to the sanitary sewer or hauled off site for proper disposal.

D. The discharger shall operate the treatment facilities approved herein on a continual basis. If accidental breakdown or normal periodic maintenance should cause cessation of operation, the discharger shall take satisfactory measures to ensure the treatment works are placed back in operation at the earliest possible time. The discharger shall report orally or via email to DEP within 24 hours of an unanticipated temporary shutdown of the treatment facility that is longer than 24 hours in duration due to a flood warning that triggers an automatic shut-down of the system or at least 24 hours prior to an anticipated maintenance shutdown if the maintenance shutdown is anticipated for a longer period of time.

E. Duty to Provide Information

1. The discharger shall furnish to DEP, within a reasonable time, any information which DEP may request to determine whether cause exists for modifying, revoking and reissuing, or terminating these Performance Criteria, or to determine compliance with these Performance Criteria. (40 CFR 122.41(h))

2. The discharger shall furnish to DEP, upon request, copies of records required to be kept by these Performance Criteria. (40 CFR 122.41(h))

3. Other Information - Where the discharger becomes aware that it failed to submit any relevant facts in an application, or submitted incorrect information in an application or in any report to DEP, it shall promptly submit the correct and complete facts or information. (40 CFR 122.41(l)(8))

F. Right of Entry

Pursuant to Sections 5(b) and 305 of Pennsylvania's Clean Streams Law, and Title 25 Pa. Code Chapter 92a and 40 CFR 122.41(i), the discharger shall allow authorized representatives of DEP and EPA, upon the presentation of credentials and other documents as may be required by law:

1. To enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under these Performance Criteria; (40 CFR 122.41(i)(1))

2. To have access to and copy, at reasonable times, any records that must be kept under these Performance Criteria; (40 CFR 122.41(i)(2))

3. To inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under these Performance Criteria; and (40 CFR 122.41(i)(3))

4. To sample or monitor at reasonable times, for the purposes of assuring compliance or as otherwise authorized by the Clean Water Act or the Clean Streams Law, any substances or parameters at any location. (40 CFR 122.41(i)(4))

ATTACHMENT B
PUBLIC NOTICE AND RESPONSIVENESS SUMMARY

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PUBLIC NOTICE

ENGINEERING EVALUATION/COST ANALYSIS
PER- AND POLYFLUOROALKYL SUBSTANCES
GROUNDWATER REMEDIATION
BUILDING 680 AND
SITE 5 – FORMER FIRE TRAINING AREA

FORMER NAVAL AIR STATION
JOINT RESERVE BASE WILLOW GROVE
HORSHAM, PENNSYLVANIA

The Naval Facilities Engineering Systems Command, Base Realignment and Closure Office (NAVFAC BRAC PMO), in cooperation with the United States Environmental Protection Agency and the Pennsylvania Department of Environmental Protection, invites public comment on the Engineering Evaluation/Cost Analysis (EE/CA) for a proposed removal action to address per- and polyfluoroalkyl substances (PFAS) impacted groundwater at former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove. The EE/CA presents the evaluation of treatment processes, building alternatives, system discharge options, and the preferred alternative specifically to address PFAS in groundwater near Building 680 and Site 5 - Fire Training Area, and was prepared under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (also known as Superfund). The objective of removal action is to reduce the current mass of PFAS in on-base groundwater in the immediate vicinities of Building 680 and Site 5 (Fire Training Area) by extracting groundwater with the highest concentrations of perfluorooctanoic acid (PFOA) and/or perfluorooctanesulfonic acid (PFOS).

Community input is integral to the removal action alternative selection process at former NASJRB Willow Grove. The public is encouraged to review and comment on this EE/CA. The public may comment by sending written comments to the following address or by e-mail.

Mr. Jonathan Harris, BRAC Environmental Coordinator
NAVFAC BRAC PMO East
4911 South Broad Street, Bldg 679
Philadelphia, PA 19112
Phone: (215) 897-4900
E-mail: jonathan.i.harris5.civ@us.navy.mil

A copy of the EE/CA will be available for review beginning on July 19th during normal hours of operation at the Horsham Township Public Library, 435 Babylon Road, Willow Grove, PA.

The document is also available for download the following link:

https://media.defense.gov/2024/Jul/10/2003501000/-1/-1/0/WG_EECA_070824_27306_FINAL.PDF

The public comment period for this EE/CA begins on July 22, 2024, and ends on September 5, 2024. Mailed comments must be postmarked no later than September 6, 2024. After the public comment period ends and public comments are taken into account, the final selected alternative will be documented in an Action Memorandum.

FOR MORE INFORMATION

If you have any questions or wish to discuss the projects, please contact the following:

Mr. Jonathan Harris, BRAC Environmental Coordinator, NAVFAC BRAC PMO East, 4911 South Broad Street, Bldg 679, Philadelphia, PA 19112. Phone (215) 897-4900 or e-mail jonathan.i.harris5.civ@us.navy.mil.

BC-39859105

SUMMARY OF COMMENTS RECEIVED AND LEAD AGENCY RESPONSES

Public comments were received during the 45-day comment period for the Engineering Evaluation/Cost Analysis (EE/CA) Per- and Polyfluoroalkyl Substances (PFAS) Groundwater Remediation, which spanned from July 22, 2024, to September 5, 2024. A summary of the public comments and corresponding responses are provided below.

Comments from Horsham Township - Received on August 30, 2024

1. Horsham Township is pleased that the Navy and the U.S. Environmental Protection Agency are continuing to address the groundwater contamination resulting from releases, spills and other activities at the former NASJRB Willow Grove, PA.

   Response: *Comment is acknowledged.*

2. Horsham Township recommends that the Navy work collaboratively with the Horsham Land Redevelopment Authority (HLRA) to ensure that the Groundwater Extraction and Treatment System (GWETS) system components are located so as to minimize impact on the future redevelopment of the base.

   Response: *Comment is acknowledged. The Navy will work closely with the HLRA to minimize impact on the future redevelopment of the base. The HLRA and other stakeholders will be afforded an opportunity to review the project design and provide input.*

3. Due to the current soil and groundwater contamination due to past use, releases and spills of PFAS compounds at NAS-JRB Willow Grove, the Navy should prepare and implement both Groundwater Management Plans and Soil Management Plans during the construction phase of the project. Such plans could be utilized by future users in the redevelopment of the site.

   Response: *The project design documents will include a waste management plan that will discuss how excavated soil and any extracted groundwater will be managed during construction. All stakeholders will have an opportunity to provide comments on this plan.*

4. Horsham Township recommends that the Navy's design of the GWETS includes the ability to accept future flows from the adjacent Biddle Air National Guard Base (ANGB). It is evident that there is PFAS contaminated groundwater under both facilities and remedial actions under CERCLA will be necessary. Both the former NAS-JRB Willow Grove and the Biddle ANGB are U.S. Department of Defense (DOD) entities owned and under the control of the U.S. government. One treatment system should be able to address the contamination under both sites.

   Response: *As discussed in the EE/CA, the expected Navy input to the GWETS was calculated at 395 gallons per minute (gpm). Although this Removal Action is limited to 400 gpm, the system will be designed to accept up to 500 gpm to accommodate potential input from the ANG side of the base or other Navy sources.*

Comments from Horsham Water & Sewer Authority - Received on September 4, 2024

1. HWSA supports the goal of removal of the source of PFAS contamination at the NASJRB site. Remediation of groundwater at the source area is an established method to reduce the magnitude and extent of a groundwater contamination plume.

   Response: *Comment is acknowledged.*

2. HWSA supports and encourages the Navy completion of an equivalent groundwater withdrawal docket with DRBC.

   Response: *Comment is acknowledged. A Groundwater Withdrawal Application and a Discharge Docket Application will be submitted to the DRBC for administrative convenience to determine applicable substantive requirements of the DRBC regulations.*

3. Further monitoring of pumping rates and water levels will be performed prior to and during operation of the GWETS. The monitoring data should be shared with HWSA.

   Response: *Comment is acknowledged. The Navy has agreed to provide to DRBC a Preliminary Hydrogeology Report prior to construction of the GWETS. The purpose of this document is to provide the DRBC with hydrogeologic background information as well as a plan for a full-scale pump test. The pump test is intended to determine the anticipated hydrologic zone of influence for the GWETS when operational. Further monitoring of pumping rates and water levels both prior to and during the operation of the GWETS is essential, and the collected data will be shared with HWSA and other stakeholders.*

4. The operation of the GWETS cannot impact the operation of the HWSA wells as they are permitted to provide public water supply.

   Response: *Comment is acknowledged. See response to previous comment.*

5. HWSA will continue to provide water level data and pump test data as needed by the Navy to determine their plans for groundwater withdrawal and treatment.

   Response: *Comment is acknowledged and appreciated. Providing these data will be helpful in optimizing the Operations and Maintenance (O&M) plan for GWETS initially and in the future.*

6. Further Navy removal actions should consider groundwater recharge during the evaluation of the remedy. Given the scale of the NASJRB site, we cannot simply eliminate the groundwater pathway as part of all remedies.

   Response: *Comment is acknowledged.*

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ATTACHMENT C
COST ESTIMATES

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NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Alternative Summary

Alternative	Description	Construction	Annual O&M	Net Present Worth
Treatment (One 500 GPM System, for Two 250 GPM Systems for "L1" Multiply by 1.32)				
T2	Treatment with GAC	$ 4,450,772	$ 1,141,864	$ 36,187,798
T3	Treatment System Using GAC and Single-Use IX Resin	$ 5,321,073	$ 1,011,424	$ 33,432,642
T4	Treatment System Using GAC and Regenerable IX Resin	$ 7,007,923	$ 983,872	$ 34,353,701
Building				
L1	Two Separate GWTS Buildings to be Constructed near Building 680 and at IR Site 5; No Pump Station Near Building 680 or at IR Site 5	$ 6,048,149	$ 216,393	$ 11,729,235
L2	One GWTS Building Constructed at IR Site 5 and One Pump Station Building Constructed Near Building 680	$ 5,890,678	$ 216,393	$ 11,580,443
L3	One GWTS Building Constructed Near Building 680 and One Pump Station Building Constructed at IR Site 5	$ 5,887,871	$ 216,393	$ 11,577,790
L4	One GWTS Inside Existing Building 177 and one Pump Station Building Constructed near Building 680	$ 5,072,061	$ 216,393	$ 10,806,947
L5	One GWTS Building Constructed at North Ramp and One Manifold Building Constructed At IR Site 5	$ 4,575,565	$ 216,393	$ 10,337,816
Discharge				
D1	Discharge to the Existing Recreational Basin near Existing Building 177	$ 914,851	$ 11,131	$ 1,235,423
D2	Discharge to Existing Storm Sewer System: Outfall 4	$ 745,104	$ 11,557	$ 1,030,867
D3	Reinjection into the Groundwater System	$ 1,369,484	$ 16,500	$ 1,752,592
D4	Discharge to Park Creek via a New Piping System	$ 669,990	$ 16,500	$ 1,091,372
D5	Discharge to Two Existing Storm Sewer Systems: Outfall 3 and Outfall 8	$ 878,404	$ 87,542	$ 3,268,753

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Alternative Scenario Summary without O&M Costs

T2: Treatment with GAC				
T2	$ 4,450,772			
	D1	D2	D3	D4	D5
L1	$ 12,838,019	$ 12,668,273	$ 13,292,653	$ 12,593,159	$ 12,801,573
L2	$ 11,256,301	$ 11,086,555	$ 11,710,935	$ 11,011,441	$ 11,219,855
L3	$ 11,253,494	$ 11,083,747	$ 11,708,127	$ 11,008,633	$ 11,217,047
L4	$ 10,437,684	$ 10,267,937	$ 10,892,317	$ 10,192,823	$ 10,401,237
L5	$ 9,941,187	**$ 9,771,441**	$ 10,395,821	**$ 9,696,327**	**$ 9,904,741**
T3: Treatment System Using GAC and Single-Use IX Resin				
T3	$ 5,321,073			
	D1	D2	D3	D4	D5
L1	$ 13,986,817	$ 13,817,071	$ 14,441,451	$ 13,741,957	$ 13,950,371
L2	$ 12,126,602	$ 11,956,856	$ 12,581,236	$ 11,881,742	$ 12,090,156
L3	$ 12,123,795	$ 11,083,747	$ 11,708,127	$ 11,008,633	$ 12,087,349
L4	$ 11,307,985	$ 11,138,239	$ 11,762,618	$ 11,063,125	$ 11,271,539
L5	$ 10,811,489	$ 10,641,742	$ 11,266,122	$ 10,566,628	$ 10,775,042
T4: Treatment System Using GAC and Regenerable IX Resin				
T4	$ 7,007,923			
	D1	D2	D3	D4	D5
L1	$ 16,213,458	$ 16,043,712	$ 16,668,092	$ 15,968,598	$ 16,177,012
L2	$ 13,813,452	$ 13,643,705	$ 14,268,085	$ 13,568,591	$ 13,777,006
L3	$ 13,810,644	$ 13,640,898	$ 14,265,278	$ 13,565,784	$ 13,774,198
L4	$ 12,994,834	$ 12,825,088	$ 13,449,468	$ 12,749,974	$ 12,958,388
L5	$ 12,498,338	$ 12,328,592	$ 12,952,972	$ 12,253,478	$ 12,461,892

Shaded, bolded values indicate one of three lowest scenarios.
All "L1" scenarios are adjusted to consider two 250 GPM treatment plants for T2, T3 and T4.

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Alternative Scenario Summary with O&M Costs

T1: No Action

	D1	D2	D3	D4	D5
L1	$ -	$ -	$ -	$ -	$ -
L2	$ -	$ -	$ -	$ -	$ -
L3	$ -	$ -	$ -	$ -	$ -
L4	$ -	$ -	$ -	$ -	$ -
L5	$ -	$ -	$ -	$ -	$ -

T2: Treatment with GAC

	D1	D2	D3	D4	D5
L1	$ 60,732,551	$ 60,527,995	$ 61,249,720	$ 60,588,500	$ 62,765,880
L2	$ 49,003,664	$ 48,799,108	$ 49,520,833	$ 48,859,613	$ 51,036,993
L3	$ 49,001,012	$ 48,796,456	$ 49,518,180	$ 48,856,960	$ 51,034,341
L4	$ 48,230,168	$ 48,025,613	$ 48,747,337	$ 48,086,117	$ 50,263,498
L5	$ 47,761,037	$ 47,556,481	$ 48,278,206	$ 47,616,986	$ 49,794,366

T3: Treatment System Using GAC and Single-Use IX Resin

	D1	D2	D3	D4	D5
L1	$ 57,095,746	$ 56,891,190	$ 57,612,914	$ 56,951,694	$ 59,129,075
L2	$ 46,248,509	$ 46,043,953	$ 46,765,677	$ 46,104,457	$ 48,281,838
L3	$ 46,245,856	$ 46,041,300	$ 46,763,024	$ 46,101,804	$ 48,279,185
L4	$ 45,475,013	$ 45,270,457	$ 45,992,181	$ 45,330,961	$ 47,508,342
L5	**$ 45,005,881**	**$ 44,801,326**	$ 45,523,050	**$ 44,861,830**	$ 47,039,211

T4: Treatment System Using GAC and Regenerable IX Resin

	D1	D2	D3	D4	D5
L1	$ 58,311,544	$ 58,106,988	$ 58,828,712	$ 58,167,492	$ 60,344,873
L2	$ 47,169,568	$ 46,965,012	$ 47,686,736	$ 47,025,516	$ 49,202,897
L3	$ 47,166,915	$ 46,962,359	$ 47,684,083	$ 47,022,863	$ 49,200,244
L4	$ 46,396,072	$ 46,191,516	$ 46,913,240	$ 46,252,020	$ 48,429,401
L5	$ 45,926,940	$ 45,722,384	$ 46,444,109	$ 45,782,889	$ 47,960,270

Shaded, bolded values indicate one of three lowest scenarios.
All "L1" scenarios are adjusted to consider two 250 GPM treatment plants for T2, T3 and T4.

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Treatment Summary

Alternative	Construction	O&M Costs	Net Present Worth
T2 (500 GPM)	$ 4,450,772	$ 1,141,864	$ 36,187,798
T3 (500 GPM)	$ 5,321,073	$ 1,011,424	$ 33,432,642
T4 (500 GPM)	$ 7,007,923	$ 983,872	$ 34,353,701
T2 (250 GPM x 2)	$ 5,875,019	$ 1,507,260	$ 47,767,893
T3 (250 GPM x 2)	$ 7,023,817	$ 1,335,079	$ 44,131,088
T4 (250 GPM x 2)	$ 9,250,458	$ 1,298,710	$ 45,346,886

NASJRB Willow Grove Engineering Evaluation/Cost Estimate Treatment System Alternative T3 Cost Summary Sheet		
Description		**Totals**
Equipment and Process Costs	$	1,667,692
Treatment System Mechanical	$	170,482
System Controls	$	2,037,566
System Start-Up	$	20,000
Means Location Cost Adjustment (2.170%)	$	84,538
Soft Costs (A&E Fees & Testing) (10.0%)	$	389,574
Contractor Profit (7%)	$	272,702
Contingency (10%)	$	483,734
General Conditions/Mobilization (5.0%)	$	194,787
One 500 GPM System Grand Total	**$**	**5,321,073**
One 500 GPM System Annual O&M	**$**	**1,011,424**
One 500 GPM Treatment System Net Present Worth (30-Year)	**$**	**33,432,642**
Two 250 GPM System Grand Total	**$**	**7,023,817**
Two 250 GPM System Annual O&M	**$**	**1,335,079**
Two 250 GPM Treatment System Net Present Worth (30-Year)	**$**	**44,131,088**

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate

Treatment System Alternative T3 Cost Estimate

Description	Units	Unit Price	Quantity	Totals
Equipment and Process Costs				
Multimedia Filters (Includes Media, 4 Vessels, Shipping, and Installation)	EA	$ 22,777.75	4	$ 91,111
Bag Filters (Includes 24 Felt Bags, 4 Six-Basket Vessels, Shipping, and Installation)	LS	$ 14,614.38	4	$ 58,458
GAC Column (Includes 2 Model 10 Vessels)	LS	$ 130,000.00	2	$ 260,000
OLC 12x30 GAC (40,000 lbs)	LBS	$ 1.10	40,000	$ 44,000
Ion Exchange Columns (Includes 2 Model 6 Vessels)	EA	$ 250,000.00	2	$ 500,000
PFAS Resin (636 cf)	CY	$ 335.00	636	$ 213,060
GAC Polish Column (Includes 2 Model 8 Vessels)	EA	$ 100,000.00	2	$ 200,000
Filtrasorb 400 GAC (20,000 lbs)	LBS	$ 1.60	20,000	$ 32,000
Shipping and Installation	EA	$ 162,453.00	1	$ 162,453
Rotary Fan Press (Includes Equipment, Shipping, and Installation)	EA	$ 106,610.00	1	$ 106,610
Treatment System Mechanical				
Extraction Well Installation	LS	$ -	0	$ -
Extraction Well Pump and Motor Pairs (Average Cost Per Pair)	EA	$ 1,806.10	29	$ 52,377
Process Piping, Fittings, Headers, and Valves	LS	$ 84,925.00	1	$ 84,925
Process Pump and Motor Pairs	EA	$ 5,530.00	6	$ 33,180
System Controls				
System Controls (Including SCADA Materials and Installation/Supervision)	LS	$ 2,037,566.00	1	$ 2,037,566
System Start-Up				
Start-Up Costs (Includes Labor and Miscellaneous Materials)	LS	$ 20,000.00	1	$ 20,000
			General Conditions/Mobilization (5.0%)	$ 194,787
			Means Location Cost Adjustment (2.170%)	$ 84,538
			Soft Costs (A&E Fees & Testing) (10.0%)	$ 389,574
			Contractor Profit (7%)	$ 272,702
			Subtotal (Excluding Mobilization/Demobilization)	$ 4,642,552
			Subtotal (Including Mobilization/Demobilization)	$ 4,837,339
			10% Contingency	$ 483,734
			One 500-GPM System Grand Total	$ 5,321,073
			Two 250-GPM Systems Grand Total	$ 7,023,817

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate

Treatment System T3 O&M Costs (30 Years)

Description	Units	Unit Price	Quantity	Totals
Felt Filter Bags	LS	$ 4.75	288	$ 1,368
OLC 12x30 GAC (1 Replacement in Lead Vessel)	LBS	$ 1.60	20000	$ 32,000
GAC Removal and Disposal	LS	$ 0.175	20000	$ 3,500
PFAS Resin (Two Changes/Yr)	CF	$ 385.00	212	$ 81,620
Resin Removal and Disposal	LBS	$ 0.175	60971	$ 10,670
Extraction Well Redevelopment/Maintenance (1/5 5 Yr Cost)	LS	$ 107,300.00	0.2	$ 21,460
Equipment/Pump Maintenance	LS	$ 169,628.00	1	$ 169,628
Sludge Disposal	EA	$ 21,705.00	2	$ 43,410
Waste Characterization	EA	$ 2,000.00	3	$ 6,000
Sampling and Analysis	LS	$ 25,850.00	12	$ 310,200
Health and Safety Supplies	LS	$ 5,400.00	1	$ 5,400
Operator	HR	$ 100.00	2600	$ 260,000
Contractor Profit (7%)	EA	$ 66,167.91	1	$ 66,168
			One 500-GPM System - Cost per Year	$ 1,011,424
			Total Cost (30 Years)	$ 30,342,715
			Two 250-GPM System - Cost per Year	$ 1,335,079
			Total Cost (30 Years)	$ 40,052,384

NASJRB Willow Grove Engineering Evaluation/Cost Estimate Treatment System T3 Net Present Worth					
Year	**Capital Cost**	**O&M Cost**	**Total Yearly Cost**	**Present Worth Factor**	**Present Worth**
				0.50%	
0	$ 5,321,073		$ 5,321,073	1.000	$ 5,321,073
1		$ 1,011,424	$ 1,011,424	0.995	$ 1,006,392
2		$ 1,011,424	$ 1,011,424	0.990	$ 1,001,385
3		$ 1,011,424	$ 1,011,424	0.985	$ 996,403
4		$ 1,011,424	$ 1,011,424	0.980	$ 991,446
5		$ 1,011,424	$ 1,011,424	0.975	$ 986,513
6		$ 1,011,424	$ 1,011,424	0.971	$ 981,605
7		$ 1,011,424	$ 1,011,424	0.966	$ 976,722
8		$ 1,011,424	$ 1,011,424	0.961	$ 971,862
9		$ 1,011,424	$ 1,011,424	0.956	$ 967,027
10		$ 1,011,424	$ 1,011,424	0.951	$ 962,216
11		$ 1,011,424	$ 1,011,424	0.947	$ 957,429
12		$ 1,011,424	$ 1,011,424	0.942	$ 952,666
13		$ 1,011,424	$ 1,011,424	0.937	$ 947,926
14		$ 1,011,424	$ 1,011,424	0.933	$ 943,210
15		$ 1,011,424	$ 1,011,424	0.928	$ 938,517
16		$ 1,011,424	$ 1,011,424	0.923	$ 933,848
17		$ 1,011,424	$ 1,011,424	0.919	$ 929,202
18		$ 1,011,424	$ 1,011,424	0.914	$ 924,579
19		$ 1,011,424	$ 1,011,424	0.910	$ 919,979
20		$ 1,011,424	$ 1,011,424	0.905	$ 915,402
21		$ 1,011,424	$ 1,011,424	0.901	$ 910,848
22		$ 1,011,424	$ 1,011,424	0.896	$ 906,316
23		$ 1,011,424	$ 1,011,424	0.892	$ 901,807
24		$ 1,011,424	$ 1,011,424	0.887	$ 897,321
25		$ 1,011,424	$ 1,011,424	0.883	$ 892,856
26		$ 1,011,424	$ 1,011,424	0.878	$ 888,414
27		$ 1,011,424	$ 1,011,424	0.874	$ 883,994
28		$ 1,011,424	$ 1,011,424	0.870	$ 879,596
29		$ 1,011,424	$ 1,011,424	0.865	$ 875,220
30		$ 1,011,424	$ 1,011,424	0.861	$ 870,866
ONE 500-GPM SYSTEM TOTAL PRESENT WORTH					**$ 33,432,642**
TWO 250-GPM SYSTEMS TOTAL PRESENT WORTH					**$ 44,131,088**

Note:
Real Discount Rate of 0.5% for 30-Year per OMB Circular No. A-94, March 2022.

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Building Location Summary

Alternative	Construction	O&M Costs	Net Present Worth
L1	$ 6,048,149	$ 216,393	$ 11,729,235
L2	$ 5,890,678	$ 216,393	$ 11,580,443
L3	$ 5,887,871	$ 216,393	$ 11,577,790
L4	$ 5,072,061	$ 216,393	$ 10,806,947
L5	$ 4,575,565	$ 216,393	$ 10,337,816

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Building Location 5 Cost Summary Sheet

Description		Totals
Mobilization/Demobilization (5% of Construction Cost)	$	171,562
E&S and Demolition	$	217,330
Site Work	$	203,302
Extraction Well Conveyance Piping	$	397,525
Transmission Main from Pump Station to GWTS	$	176,760
Concrete/Asphalt Pavement	$	481,440
GWTS Storage Tank (10,000-gal)	$	40,049
Pump Station Building (256 SF): Mechanical, Structural, HVAC, and Utilities	$	55,752
GWTS Building (15,625 SF [EA Cost])	$	1,859,087
Contractor Profit (7%)	$	252,196
Contingency (20%)	$	720,561
Grand Total	**$**	**4,575,565**
Annual O&M	**$**	**216,393**
One 500 GPM Treatment System Net Present Worth (30-Year)	**$**	**8,342,265**

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Building Location 5 Cost Estimate

Description	Units	Unit Price	Quantity	Totals
Mobilization/Demobilization (5%)	EA	$ 171,562.23	1	$ 171,562
E&S and Demolition				
Drop Inlet Silt Trap (Inlet Protection, Type A)	EA	$ 357.50	6	$ 2,145
Compost Sock Sediment Trap	LF	$ 7.38	14760	$ 108,988
Landscape Topsoil (4" Depth)	CY	$ 62.61	1401	$ 87,714
Lime	TON	$ 790.92	10	$ 7,909
Fertilizer	TON	$ 3,640.00	0.8	$ 2,912
Seed	LB	$ 8.45	501	$ 4,233
Dispose of Existing Pipe	LF	$ 22.41	153	$ 3,429
Site Work				
Pavement Striping	LS	$ 1,183.00	2	$ 2,366
Bollard	EA	$ 967.97	101	$ 97,765
Std. Curb	LF	$ 51.13	691	$ 35,330
Parking Block	EA	$ 155.43	8	$ 1,243
Sign	EA	$ 112.09	2	$ 224
Fencing	LF	$ 40.82	1626	$ 66,373
Extraction Well Conveyance Piping				
1" HDPE Piping	LF	$ 0.86	53125	$ 45,581
1.5" HDPE Piping	LF	$ 1.25	50175	$ 62,719
2" HDPE Piping	LF	$ 2.20	7610	$ 16,719
Reg 45-Deg Elbow 1"	EA	$ 94.86	15	$ 1,423
Reg 45-Deg Elbow 1.5"	EA	$ 100.00	15	$ 1,500
Reg 45-Deg Elbow 2"	EA	$ 117.04	2	$ 234
Tee-Line Flow 1"	EA	$ 145.41	15	$ 2,181
Tee-Line Flow 1.5"	EA	$ 145.41	15	$ 2,181
Tee-Line Flow 2"	EA	$ 176.96	2	$ 354
Backflow Preventer Threaded Gate Valve 1"	EA	$ 2,252.09	15	$ 33,781
Backflow Preventer Threaded Gate Valve 1.5"	EA	$ 2,252.09	15	$ 33,781
Backflow Preventer Threaded Gate Valve 2"	EA	$ 3,556.03	2	$ 7,112
Backflow Preventer Double Check Ball Valve 1"	EA	$ 880.54	15	$ 13,208
Backflow Preventer Double Check Ball Valve 1.5"	EA	$ 880.54	15	$ 13,208
Backflow Preventer Double Check Ball Valve 2"	EA	$ 2,729.43	2	$ 5,459
Exc., Backfill, Trench (Extraction Well & Open Cut Trench)	TON	$ 52.47	2388	$ 125,282
Valve Box Large with Lid	EA	$ 546.69	60	$ 32,801
Transmission Main from Pump Station to GWTS (HDPE - 6" 3325 LF)				
6" Reg 45-Deg Elbow	EA	$ 500.24	4	$ 2,001
6" Tee-Line Flow	EA	$ 793.13	0	$ -
4 "Gate Valve (CI)	EA	$ 1,761.36	0	$ -
6 "Gate Valve (CI)	EA	$ 2,767.88	2	$ 5,536
6" Swing Check Valve	EA	$ 3,010.18	1	$ 3,010
6" Air Release Valves	EA	$ 6,041.39	2	$ 12,083
Exc., Backfill, Trench (Extraction Well & Open Cut Trench)	TON	$ 52.47	739	$ 38,768
Pipe Bedding 4"	TON	$ 48.52	185	$ 8,962
Install 6-inch HDPE pipe	LF	$ 32.00	3325	$ 106,400
Concrete/Asphalt Pavement				
Bituminous Concrete Surface Course 3"	TON	$ 178.53	1081	$ 192,990
Crushed Stone Base Course 8"	TON	$ 52.00	2882	$ 149,864
Compacted Subgrade 4"	TON	$ 84.50	1447	$ 122,272
7" Class A-4 Concrete Pavement (Concrete Pad)	CY	$ 223.60	11.9	$ 2,661
Sidewalk Restoration (Concrete)	SY	$ 58.50	4	$ 234
Type A Milling 2"	SY	$ 2.68	5011	$ 13,419
GWTS Storage Tank (10,000-gal)	EA	$ 40,048.65	1	$ 40,049

NASJRB Willow Grove

Engineering Evaluation/Cost Estimate

Building Location 5 Cost Estimate

Description	Units	Unit Price	Quantity	Totals
Pump Station Building (256 SF): Architectural, Mechanical, Structural, HVAC, and Utilities				
Water Service Line Connection	EA	$ 500.00	1	$ 500
Sanitary Sewer Connection	EA	$ 500.00	1	$ 500
Mechanical (Includes pumps and piping)	LS	$ 31,200.00	1	$ 31,200
Architectural	SF	$ 110.00	0	$ -
Structural	SF	$ 65.00	256	$ 16,640
HVAC	SF	$ 27.00	256	$ 6,912
GWTS Building (15,625 SF [EA Cost])	EA	$ 1,859,087.00	1	$ 1,859,087
			Subtotal (Excluding Mobilization/Demobilization)	$ 3,431,245
			Subtotal (Including Mobilization/Demobilization)	$ 3,602,807
			20% Contingency	$ 720,561
			Grand Total	$ 4,323,368

NASJRB Willow Grove

Engineering Evaluation/Cost Estimate

Building Location 5 O&M Costs (30 Years)

Description	Units	Unit Price	Quantity	Totals
Building Maintenance/Inspections	LS	$1,000.00	1	$ 1,000
Electricity (2,051,365 kwh, includes power for plant operation)	Kwh	$0.11	2051365	$ 215,393
			Cost per Year	$ 216,393
			Total Cost (30 Years)	$ 6,491,800

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Building L5 Net Present Worth

Year	Capital Cost	O&M Cost	Total Yearly Cost	Present Worth Factor	Present Worth
				0.50%	
0	$ 4,323,368		$ 4,323,368	1.000	$ 4,323,368
1		$ 216,393	$ 216,393	0.995	$ 215,317
2		$ 216,393	$ 216,393	0.990	$ 214,246
3		$ 216,393	$ 216,393	0.985	$ 213,180
4		$ 216,393	$ 216,393	0.980	$ 212,119
5		$ 216,393	$ 216,393	0.975	$ 211,064
6		$ 216,393	$ 216,393	0.971	$ 210,014
7		$ 216,393	$ 216,393	0.966	$ 208,969
8		$ 216,393	$ 216,393	0.961	$ 207,929
9		$ 216,393	$ 216,393	0.956	$ 206,895
10		$ 216,393	$ 216,393	0.951	$ 205,865
11		$ 216,393	$ 216,393	0.947	$ 204,841
12		$ 216,393	$ 216,393	0.942	$ 203,822
13		$ 216,393	$ 216,393	0.937	$ 202,808
14		$ 216,393	$ 216,393	0.933	$ 201,799
15		$ 216,393	$ 216,393	0.928	$ 200,795
16		$ 216,393	$ 216,393	0.923	$ 199,796
17		$ 216,393	$ 216,393	0.919	$ 198,802
18		$ 216,393	$ 216,393	0.914	$ 197,813
19		$ 216,393	$ 216,393	0.910	$ 196,829
20		$ 216,393	$ 216,393	0.905	$ 195,850
21		$ 216,393	$ 216,393	0.901	$ 194,875
22		$ 216,393	$ 216,393	0.896	$ 193,906
23		$ 216,393	$ 216,393	0.892	$ 192,941
24		$ 216,393	$ 216,393	0.887	$ 191,981
25		$ 216,393	$ 216,393	0.883	$ 191,026
26		$ 216,393	$ 216,393	0.878	$ 190,076
27		$ 216,393	$ 216,393	0.874	$ 189,130
28		$ 216,393	$ 216,393	0.870	$ 188,189
29		$ 216,393	$ 216,393	0.865	$ 187,253
30		$ 216,393	$ 216,393	0.861	$ 186,321
				Total Present Worth	**$ 10,337,816**

Note:
Real Discount Rate of 0.5% for 30-Year per OMB Circular No. A-94, March 2022.

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Discharge Location Summary

Alternative	Construction	Annual O&M Cost	Net Present Worth
D1	$ 914,851	$ 11,131	$ 1,235,423
D2	$ 745,104	$ 11,557	$ 1,030,867
D3	$ 1,369,484	$ 16,500	$ 1,752,592
D4	$ 669,990	$ 16,500	$ 1,091,372
D5	$ 878,404	$ 87,542	$ 3,268,753

NASJRB Willow Grove

Engineering Evaluation/Cost Estimate

Discharge Location 4 Cost Summary Sheet

Description	Totals
Mobilization/Demobilization (5% of Construction Cost)	$ 25,344
E&S and Demolition	$ 185,751
Discharge System (8" PVC 5,239 LF)	$ 286,410
Concrete/Asphalt Pavement	$ 30,047
Contractor Profit (7%)	$ 36,929
Contingency (20%)	$ 105,510
Grand Total	**$ 669,990**
Annual O&M	**$ 16,500**
One 500 GPM Treatment System Net Present Worth (30-Year)	**$ 1,097,269**

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Discharge Location 4 Cost Estimate

Description	Units	Unit Price	Quantity	Totals
Mobilization/Demobilization (5%)	EA	$ 25,110.35	1	$ 25,110
E&S and Demolition				
Drop Inlet Silt Trap (Inlet Protection, Type A)	EA	$ 357.50	12	$ 4,290
EC-1, Class A1 Riprap (Velocity Control)	TON	$ 221.31	1.1	$ 243
Compost Sock Sediment Trap	LF	$ 7.38	11397	$ 84,110
Landscape Topsoil (4" Depth)	CY	$ 62.61	436	$ 27,298
Lime	TON	$ 790.92	3	$ 2,373
Fertilizer	TON	$ 3,640.00	0.3	$ 1,092
Seed	LB	$ 8.45	156	$ 1,318
Demolition of Pavement	SY	$ 90.44	719	$ 65,026
Discharge System				
8" HDPE Pipe (With Installation 50%)	LF	$ 30.00	4405	$ 132,150
12" Trenching and Backfill with Compaction (36")	LF	$ 2.17	4405	$ 9,574
Pipe Bedding	CY	$ 8.25	653	$ 5,384
Cleanouts	EA	$ 3,500.00	37	$ 129,500
Motorized Valve	EA	$ 4,900.69	2	$ 9,801
Concrete/Apshalt				
Bituminous Concrete Surface Course 3"	TON	$ 178.53	83	$ 14,818
Crushed Stone Base Course 8"	TON	$ 52.00	221	$ 11,492
Sidewalk Restoration (Concrete)	SY	$ 58.50	10	$ 585
Type A Milling 2"	SY	$ 2.68	1177	$ 3,152
			Subtotal (Excluding Mobilization/Demobilization)	$ 502,207
			Subtotal (Including Mobilization/Demobilization)	$ 527,317
			20% Contingency	$ 105,463
			Grand Total	$ 632,781

NASJRB Willow Grove

Engineering Evaluation/Cost Estimate

Discharge Location 4 O&M Costs (30 Years)

Description	Units	Unit Price	Quantity	Totals
Maintenance/Inspections	LS	$14,399.61	1	$ 14,400
Electricity (30,000 kwh, includes power for plant operation)	Kwh	$0.07	30000	$ 2,100
			Cost per Year	$ 16,500
			Total Cost (30 Years)	$ 494,988

NASJRB Willow Grove
Engineering Evaluation/Cost Estimate
Discharge D4 Net Present Worth

Year	Capital Cost	O&M Cost	Total Yearly Cost	Present Worth Factor	Present Worth
				0.50%	
0	$ 632,781		$ 632,781	1.000	$ 632,781
1		$ 16,500	$ 16,500	0.995	$ 16,418
2		$ 16,500	$ 16,500	0.990	$ 16,336
3		$ 16,500	$ 16,500	0.985	$ 16,255
4		$ 16,500	$ 16,500	0.980	$ 16,174
5		$ 16,500	$ 16,500	0.975	$ 16,093
6		$ 16,500	$ 16,500	0.971	$ 16,013
7		$ 16,500	$ 16,500	0.966	$ 15,934
8		$ 16,500	$ 16,500	0.961	$ 15,854
9		$ 16,500	$ 16,500	0.956	$ 15,775
10		$ 16,500	$ 16,500	0.951	$ 15,697
11		$ 16,500	$ 16,500	0.947	$ 15,619
12		$ 16,500	$ 16,500	0.942	$ 15,541
13		$ 16,500	$ 16,500	0.937	$ 15,464
14		$ 16,500	$ 16,500	0.933	$ 15,387
15		$ 16,500	$ 16,500	0.928	$ 15,310
16		$ 16,500	$ 16,500	0.923	$ 15,234
17		$ 16,500	$ 16,500	0.919	$ 15,158
18		$ 16,500	$ 16,500	0.914	$ 15,083
19		$ 16,500	$ 16,500	0.910	$ 15,008
20		$ 16,500	$ 16,500	0.905	$ 14,933
21		$ 16,500	$ 16,500	0.901	$ 14,859
22		$ 16,500	$ 16,500	0.896	$ 14,785
23		$ 16,500	$ 16,500	0.892	$ 14,711
24		$ 16,500	$ 16,500	0.887	$ 14,638
25		$ 16,500	$ 16,500	0.883	$ 14,565
26		$ 16,500	$ 16,500	0.878	$ 14,493
27		$ 16,500	$ 16,500	0.874	$ 14,421
28		$ 16,500	$ 16,500	0.870	$ 14,349
29		$ 16,500	$ 16,500	0.865	$ 14,278
30		$ 16,500	$ 16,500	0.861	$ 14,207
				Total Present Worth	**$ 1,091,372**

Note:
Real Discount Rate of 0.5% for 30-Year per OMB Circular No. A-94, March 2022.

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