



# Welcome to the RAB Meeting!



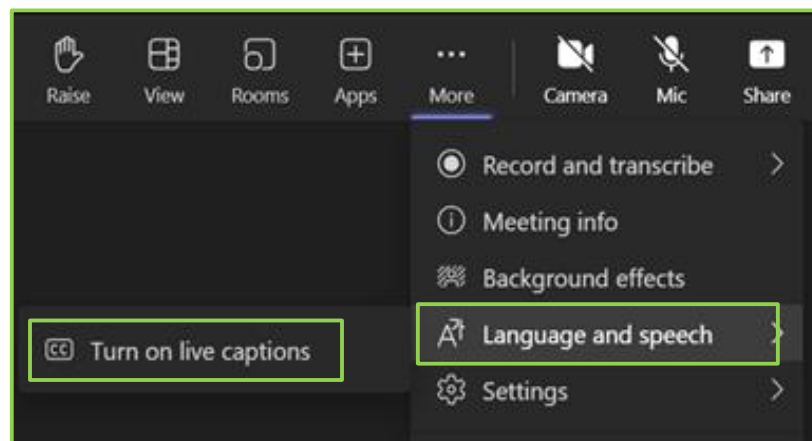
Thank you for joining the  
Restoration Advisory Board Meeting for  
NASJRB Willow Grove and the Biddle Air National  
Guard Base

The meeting will start at 2:00 p.m.

For captions, click More ●●● on the  
screen

Select 'Language and Speech'

Click 'Turn on live captions'





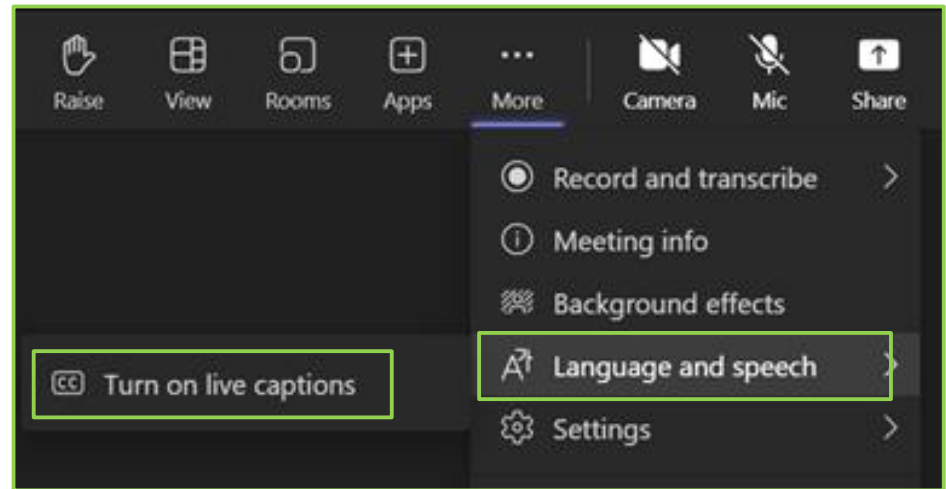


# Teams *TOOLS*



- **Closed Captioning**

- Select More ●●●
- Select “Language and speech”
- Click “Turn on live captions”



- **Screen Layout**

- To adjust the layout on your screen, select More ●●●
- Choose the preferred view from available choices.  
Options include Full Screen, Gallery View, and Focus on Content



# **NASJRB Willow Grove Restoration Advisory Board (RAB) Meeting**

## **December 7, 2023**



# *Virtual Meeting Information*



- This is a hybrid meeting with in-person and virtual attendees.
- The virtual meeting will show the presentations.
- The presenters and in-person attendees will be audio-only.
- The meeting is not being recorded; minutes will be prepared. Webinar and in-person sign-in names will be used for the minutes.
- Public notices were published November 22 and November 29, posted on the Navy website, and provided to the mailing list.



# Outline/Agenda

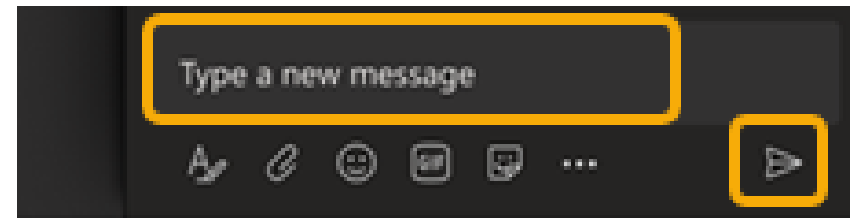
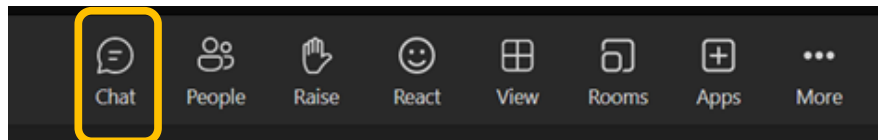


- Welcome and Announcements
- Navy Drinking Water Update
- Navy Planned Groundwater Extraction and Treatment System Discharge Evaluation
- RAB Member or Community Comments/Questions
- Air National Guard Drinking Water Update
- Air National Guard Community Involvement Plan
- Air National Guard Upcoming ETCSP Research
- RAB Member or Community Comments/Questions
- Regulator Comments
- RAB Member or Community Comments/Questions
- Environmental Updates Conclude
- Meeting Conclusion

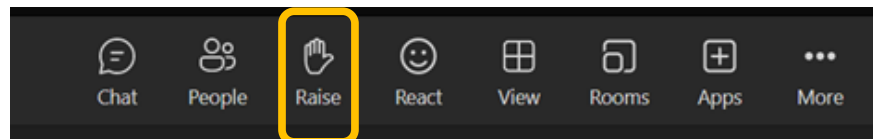


# Virtual Attendee Questions

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- 2) Raise your hand to be recognized and have your microphone unmuted. Select 'Raise your hand' icon in the meeting controls.



- 3) Phone-only attendees can dial \*6 to raise their hand and have the opportunity to ask a question.



# ***RAB Background Information***



- A Restoration Advisory Board (RAB) is a stakeholder group that meets on a regular basis to discuss environmental restoration at a specific property that is either currently or was formerly owned by Department of Defense (DoD), but where DoD oversees the environmental restoration process.
- RABs enable people interested in the environmental cleanup at a specific installation to exchange information with representatives of regulatory agencies, the installation, and the community. RABs may only address issues associated with environmental restoration activities.
- Mr. Bill Walker, Horsham Township Manager, is the RAB community co-chair.
- Health-related issues are not addressed by the RAB. Health agency professional contact information will be provided after the Navy and Air National Guard Environmental Restoration presentations.

Source: 10 USC 2705 and DoD Restoration Advisory Board Rule Handbook  
<https://denix.osd.mil/rab/home/unassigned/rab-rule-handbook/>



# **Introduce Lt. Col. Brian Silver**



# ***2024 RAB Meeting Planned***



- Thursday, March 14, 2024 at 6:00 p.m.
- Thursday, July 11, 2024 at 6:00 p.m.
- Thursday, November 14, 2024 at 1:00 p.m. (with Base Tour).



# **RAB Community Member Appointment**



# Environmental Restoration Program Update



# ***Private Drinking Water Well Sampling for PFAS***



- January 14, 2023: PA Maximum Contaminant Levels (MCLs) for PFOA and PFOS were published.
  - PFOA: 14 ppt
  - PFOS: 18 ppt
- Navy BRAC PMO evaluated historic drinking water data and identified locations where:
  - PFOA and/or PFOS concentrations were above the PA MCLs,
  - Laboratory detection limits were above the PA MCLs, or
  - Samples were more than three years old.



# ***Private Drinking Water Well Sampling for PFAS***



- May 2023:
  - Began offering bottled water to Navy-impacted locations above PA MCLs.
  - Began resampling of locations where laboratory detection limits were above PA MCLs or samples were more than 3 years old.
- September 2023:
  - Awarded modification to Cooperative Agreement with HWSA to address the PA MCLs.
- November 2023:
  - Began issuing offer letters for municipal water connections in HWSA service area.



# Private Drinking Water Well Sampling for PFAS

(Cont.)



- The Navy has provided over \$22 million to Horsham Water and Sewer Authority (HWSA) to address PFAS via a Cooperative Agreement:
  - Filtration systems at five HWSA Municipal Wells.
  - Over 100 public water connections for private wells.
  - Additional funding was recently provided to address the new Pennsylvania MCLs.

Private well sampling summary	Current
PFOA/PFOS Concentrations above 70 ppt, not yet connected	2
PFOA or PFOS Concentrations above PA MCL and < 70 ppt	64
PFOA or PFOS Concentrations below PA MCL	80
PFOA or PFOS below PA MCL but detection limit over PA MCL	54



# Private Drinking Water Well Sampling Area



Private drinking water well sampling for PFOA/PFOS and provision of bottled drinking water is being performed by Tetra Tech, a U.S. Navy contractor.

Point of contact is:

Emily Barley

Tetra Tech Sampling Task Manager

E-mail:

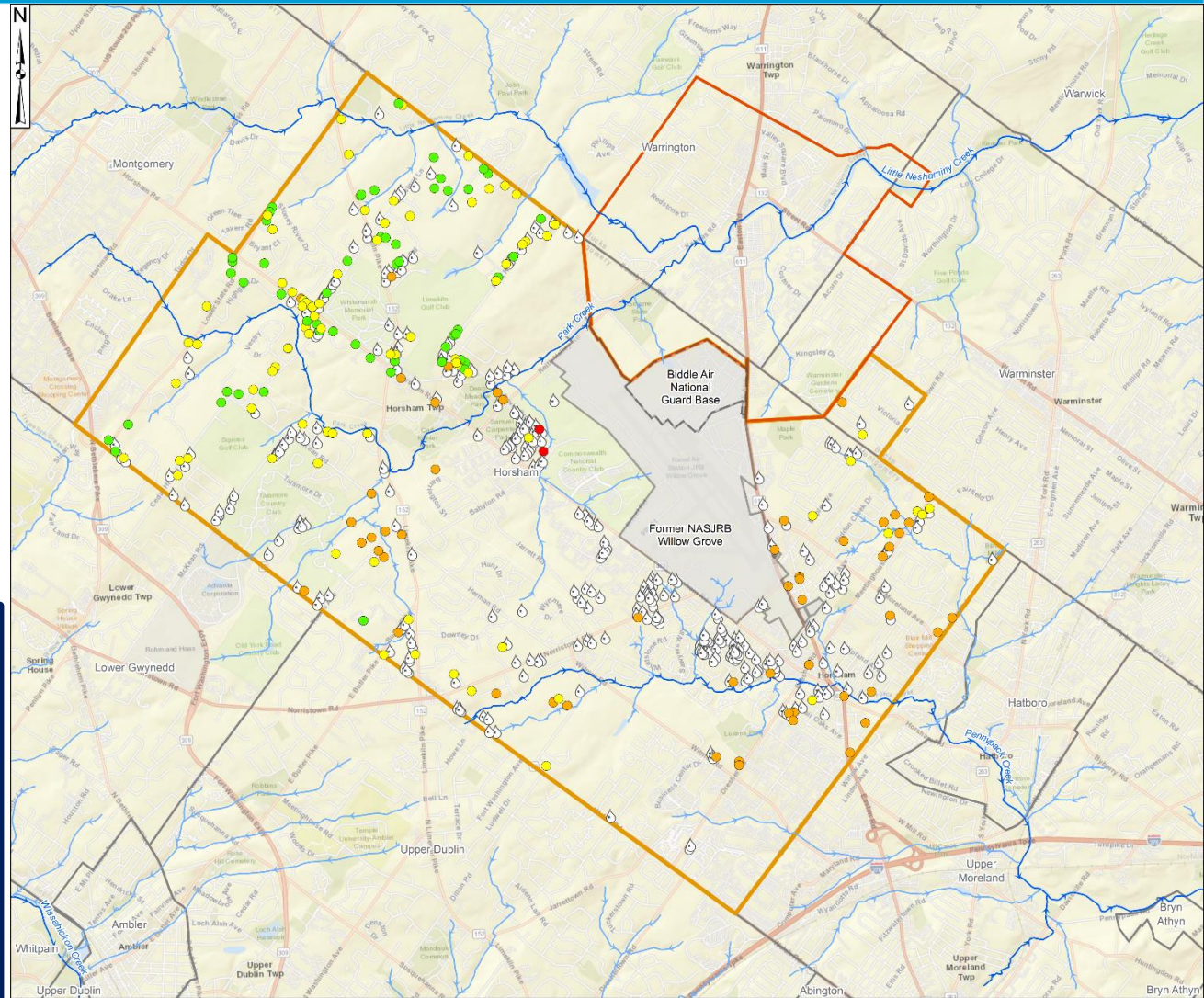
[emily.valentine@tetratech.com](mailto:emily.valentine@tetratech.com)

Phone: (412) 921-8544

## Legend

Symbol color represents highest concentrations.

- PFOA or PFOS Concentrations above 70 ppt (2 Wells)
- PFOA or PFOS Concentrations above PADEP MCL and <70 ppt (53 Wells)
- PFOA and PFOS Concentrations less than PADEP MCL (79 Wells)
- PFOA and PFOS Concentrations below Detection Limit, but Detection Limit exceeds PADEP MCL (54 Wells)
- Public Water Connection (Some not by Navy)
- Creek
- Tributary
- ▭ Township Boundary
- ▭ Biddle Air National Guard Base
- ▭ Former NASJRB Willow Grove
- ▭ Biddle Air National Guard Base Sampling Area
- ▭ Former NASJRB Willow Grove Sampling Area





# ***Private Drinking Water Well Sampling for PFAS***

*(Cont.)*



- March 14, 2023: EPA announced the proposed draft National Primary Drinking Water Regulation (NPDWR) for 6 PFAS, including PFOA and PFOS, for public comment.
  - Proposed MCL PFOA: 4 ppt
  - Proposed MCL PFOS: 4 ppt
- Navy BRAC PMO continues to review our existing data and conduct additional sampling, where necessary, in preparation to incorporate EPA's final drinking water standards.



# Five-Year Review



- The purpose of the Five-Year Review is to ensure that the selected remedies are effectively protecting public health and the environment.
- NAVFAC BRAC PMO, in cooperation with the EPA and PADEP, has completed the third Five-Year Review of the remedies implemented at Former NASJRB Willow Grove.
- Final signed document was distributed to the EPA, PADEP, and HLRA on 10/2/23.
- The public notice of completion of the Five-Year Review was published on the newspaper on 11/1/23 and on the Navy website.



# ***Action Summary Since Previous RAB Meeting***



- Finalized the Third Five-Year Review.
- Finalized the 2023 Site Management Plan.
- Addressed additional EPA comments regarding risk calculation evaluation for Site 12 Groundwater Technical Memo.
- Finalized Site 5 LTM In-Situ Bioremediation Annual Report for Year 7.
- Completed second post-injection sampling at Site 5 bioremediation cell.
- Finalized Willow Grove 2022 Private Well Annual Report.
- Continued private drinking water well sampling and provided bottled water to properties with detections over PA MCL.
- Continued operation of the Hangar 680 PFAS pilot test treatment system.
- Continued operation of the Site 5 PFAS pilot test treatment system.
- Completed Round 17 surface water sampling event (September 2023).
- Submitted the Maple Avenue Technical Memorandum to support FOST 1 for EPA and PADEP review.
- Submitted Environmental Due Diligence Technical Memorandum to support FOST 1 for EPA and PADEP review.
- Submitted the PFAS RI Soil SAP Addendum for Lysimeter Installation for EPA and PADEP review.



# ***Actions Anticipated to be Completed by Next RAB***



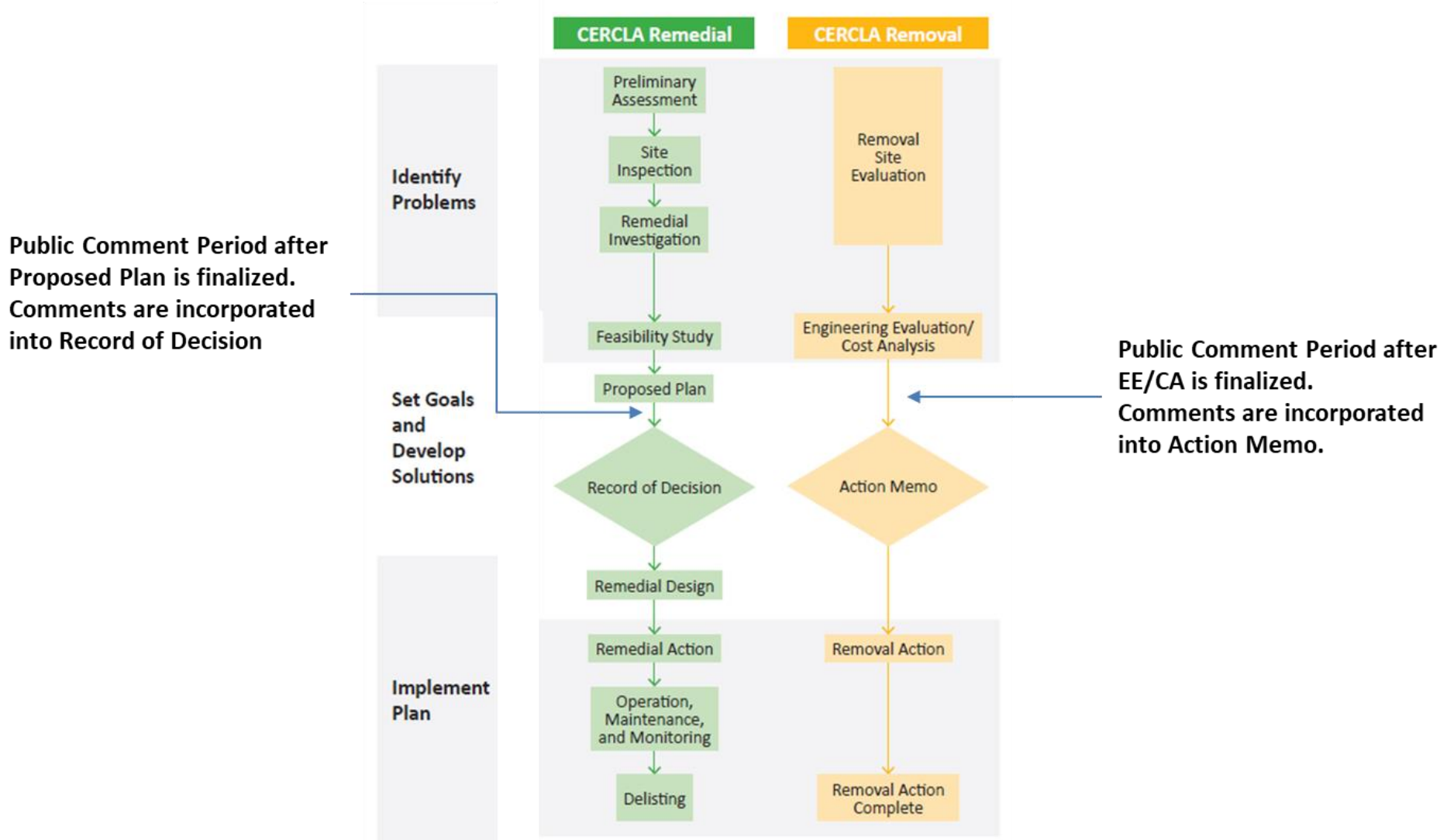
- Submit the Draft Site 3 and Site 12 LUC RDs.
- Finalize the Site 12 Groundwater Technical Memorandum.
- Submit the Site 5 LTM In-Situ Bioremediation Annual Report for Year 8 for EPA and PADEP review.
- Continue private drinking water well sampling and providing bottled water. Begin issuing connection offer letters.
- Continue operation of the Hangar 680 and Site 5 PFAS pilot test treatment systems.
- Finalize EE/CA and hold a public comment period.
- Complete Round 18 surface water sampling.
- Issue offer letters for municipal connections for PA MCL exceedances within HWSA service area



# **Engineering Evaluation / Cost Analysis (EE/CA) for Planned Groundwater Extraction and Treatment System (GWETS)**



# CERCLA Process





# EE/CA Status Update



- The EE/CA was presented at the September 2023 RAB Meeting.
- Public concerns were raised regarding:
  - Impact of the GWETS on the capacity of the drinking water aquifer
  - Contribution of GWETS discharge to flooding in Park Creek
- Finalization of the EE/CA was paused to allow further evaluation of these concerns.
- This presentation will provide the results of the evaluation and updates to the EE/CA.



# ***Public Comment Period***



- Public comment period will be 45 days and will start shortly after the EE/CA is finalized.
- A public notification announcing the comment period will be provided in the local newspaper and on the Willow Grove BRAC PMO Website. An email will also be sent to the Willow Grove subscriber list.
- The document will be available electronically on the Willow Grove BRAC PMO Website and a hard copy will be available at the Horsham Public Library.
- Written responses to public comments will be provided in a responsiveness summary. This summary will be attached to the subsequent Action Memorandum.



# What is an EE/CA?



- Goal is to develop and select a Removal Action alternative for Non-Time Critical Removal Action (NTCRA) in accordance with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) criteria to ensure that the selected action is protective of human health and the environment and compliant with Applicable or Relevant and Appropriate Requirements (ARARs).
- Evaluate alternatives based on:
  - Effectiveness
  - Implementability
  - Cost
- All decisions are documented in an Action Memorandum

Removal Actions are interim measures that can be identified and undertaken at any step in the CERCLA remedial process.



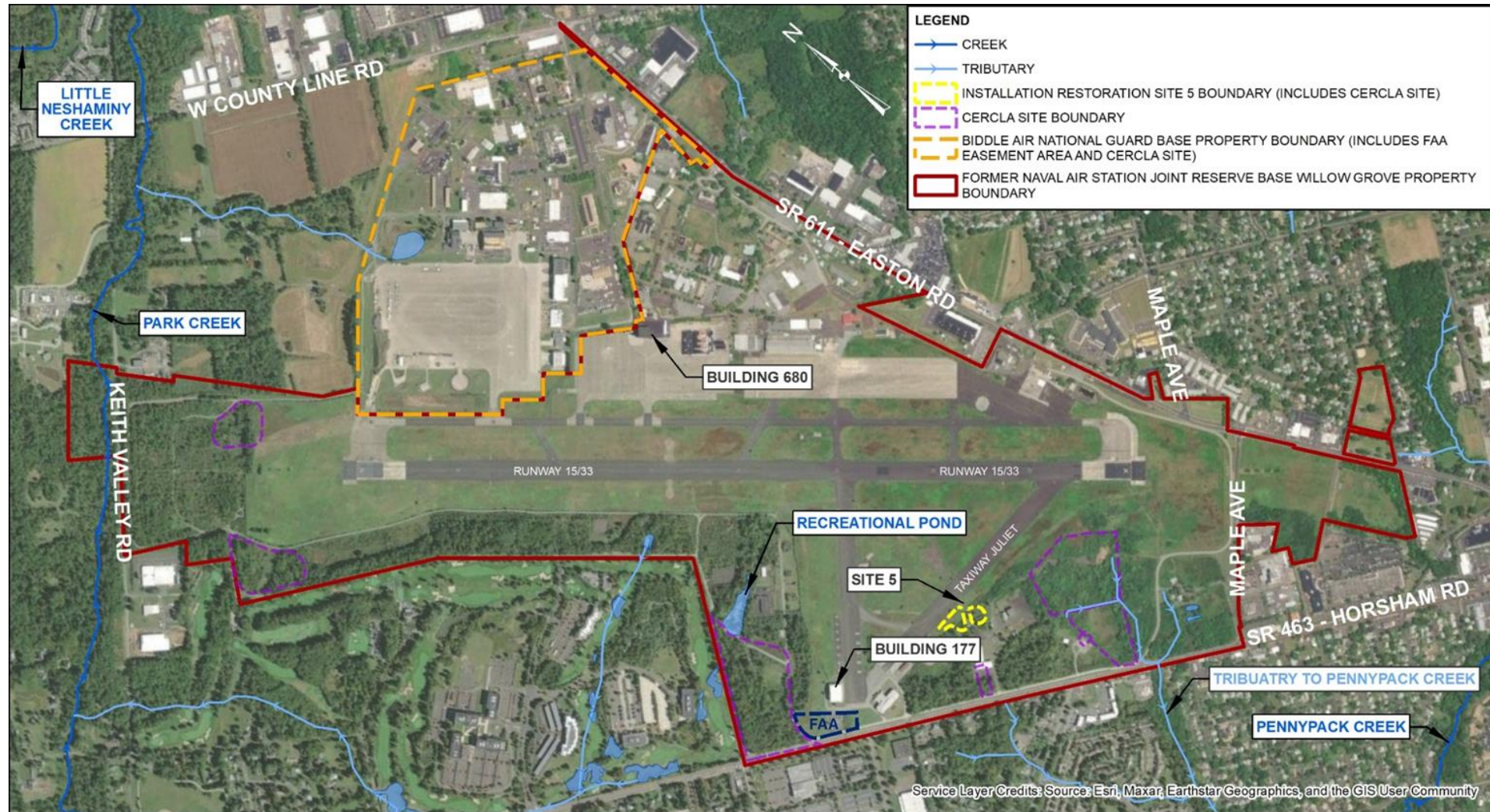
# ***GWETS System Objectives***



- Reduce the mass of PFAS in groundwater in and around Building 680 and IR Site 5. Additional PFAS mass removal will also be focused in the vicinity of Building 177.
- Treat extracted groundwater to meet the discharge criteria established in the NPDES permit equivalency issued by the PADEP.
- Size the treatment system to treat 125 percent (~500-gpm) of the maximum groundwater flow (395-gpm) expected to be extracted from 29 extraction wells.
- The EE/CA evaluated alternatives for the following:
  - PFAS treatment technologies.
  - System layout and building locations.
  - Effluent discharge locations.



# Site Layout

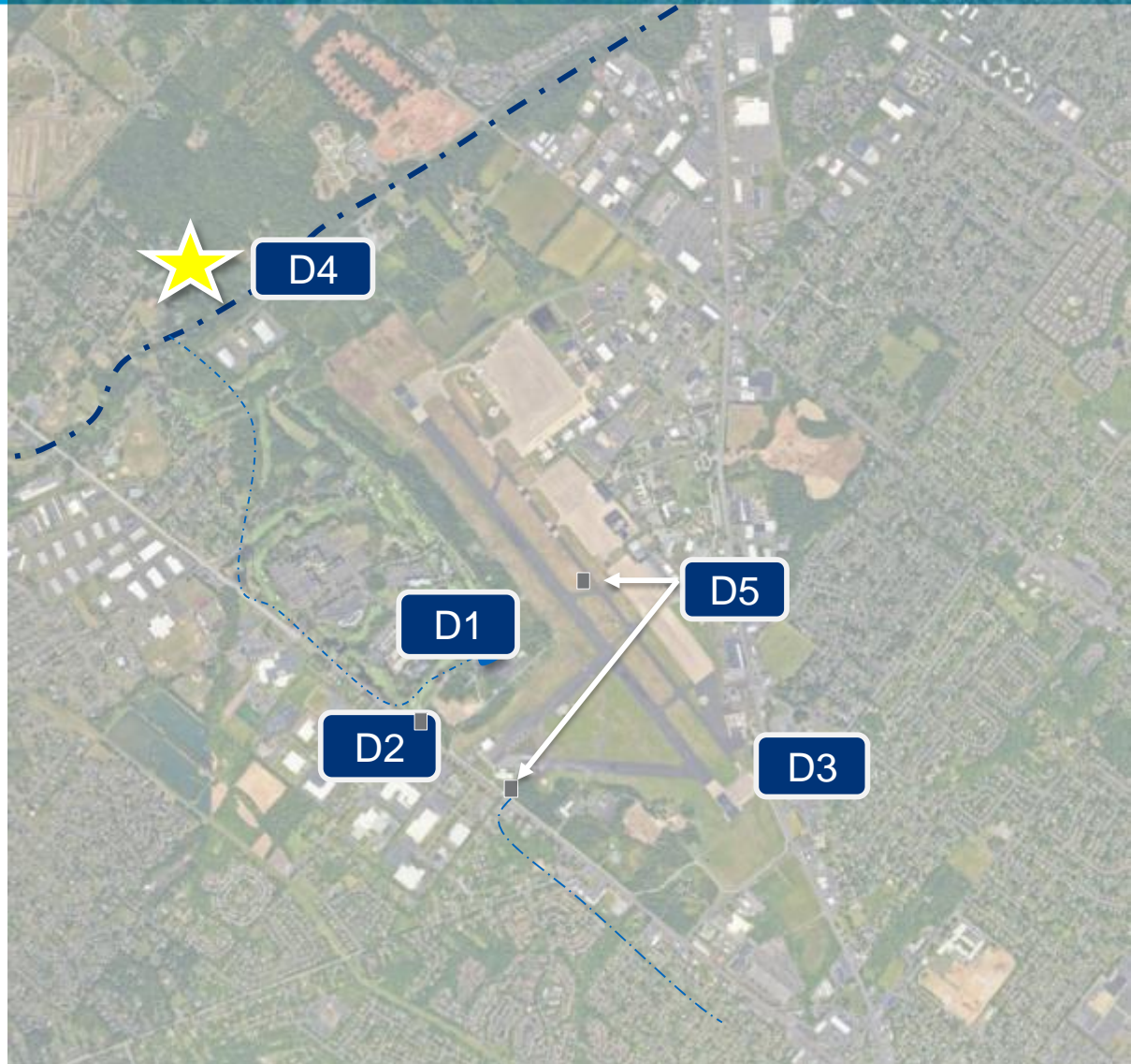




# Discharge Options Included in the EE/CA



- **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 via a new piping system
- **Alternative D5:** Discharge to two existing storm sewer systems: Outfall 3 and Outfall 8





# ***EE/CA Review Meetings***



Several meetings have been held in the last quarter to discuss potential discharge options for the GWETs:

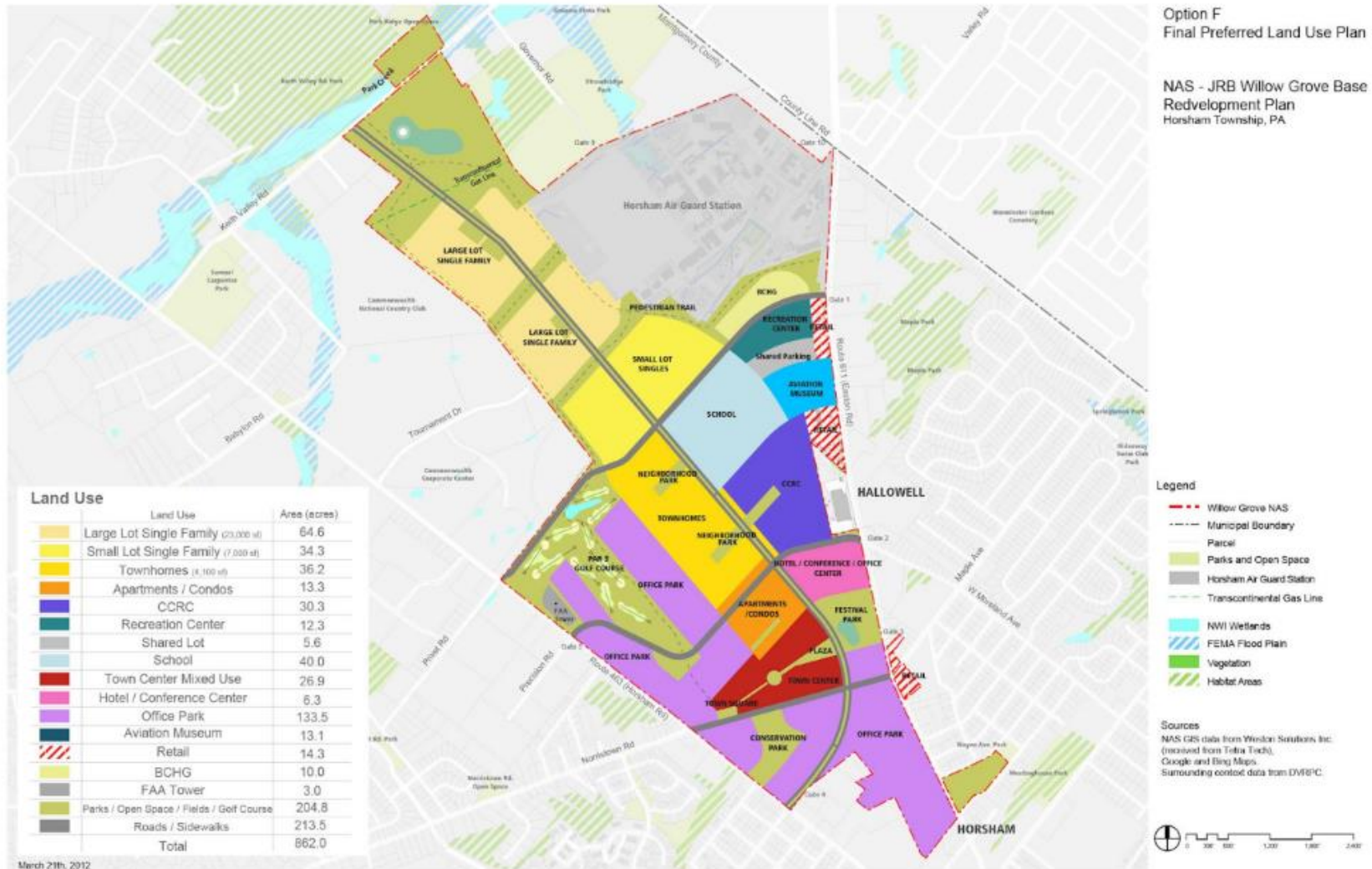
- September 14, 2023 RAB Meeting
- October 25, 2023 Meeting with EPA, PADEP, and USGS
- November 1, 2023 Meeting with EPA, USGS, PADEP, HSWA and DRBC

## **Balancing several objectives for GWETS operation**

- Remove PFAS mass from groundwater in areas with the highest concentrations and reduce offsite migration.
- Maintain sufficient capacity in drinking water aquifer
- Promote future beneficial reuse of the base
- Avoid contributing to the localized flooding in Park Creek that occurs during heavy rain events



# Redevelopment Plan







## Concern #1

# Impact of the GWETS on the Capacity of the Drinking Water Aquifer



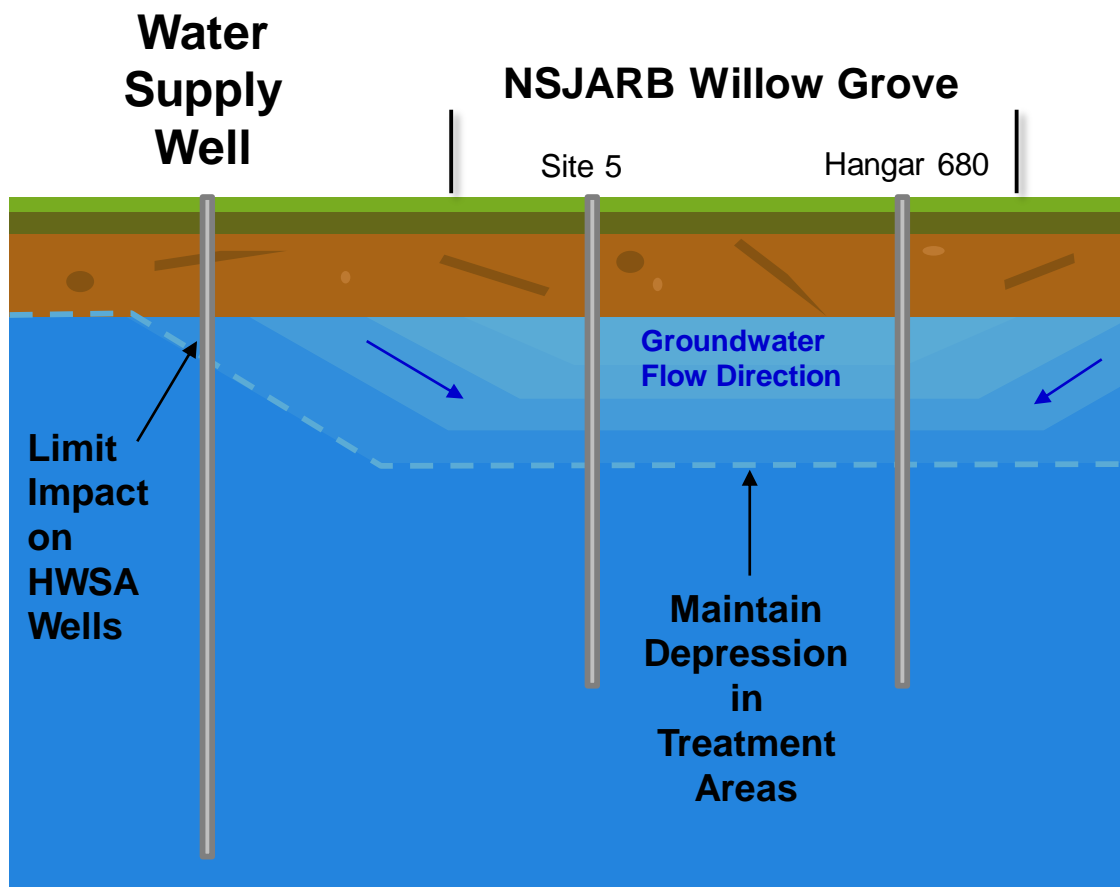
# Proposed Solution



**Solution:** Set GWETs system controls to limit influence on off-site water supply wells

The goal of the GWETs is to extract just enough water to limit off-site migration of groundwater

System flow rate and/or flow rates from individual wells will be adjusted to limit off-base influence on water table

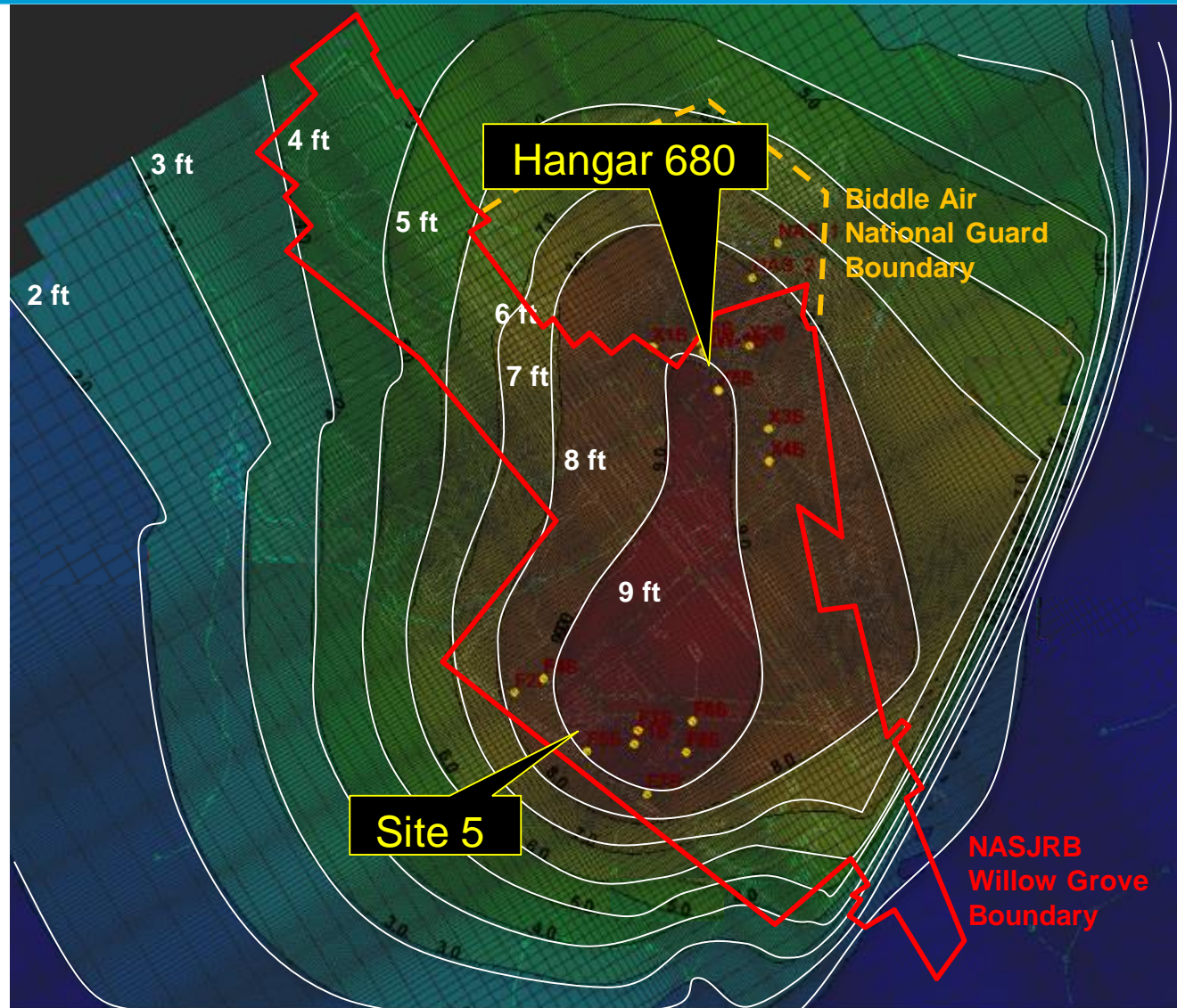




# Estimated Groundwater Table Drawdown



- Modeling estimates a maximum drawdown of around 3% of the aquifer thickness as a result of the GWETS at Site 5
- Drawdown for HWSA wells ranges from <1 ft to 5 feet
- Goal is to remove low volumes of water with high concentrations of PFAS





# Reinjection Alternatives



	Infiltration Galleries		Injection Wells		Discharge to Park Creek	
Would require use of a large amount of land?		Yes		Moderate		No
Could interfere with GWETS operation?		Moderate		Yes		No
Could reliably accept 100% of the system discharge?		No		No		Yes
Could negatively impact PFAS migration?		Yes		Yes		No

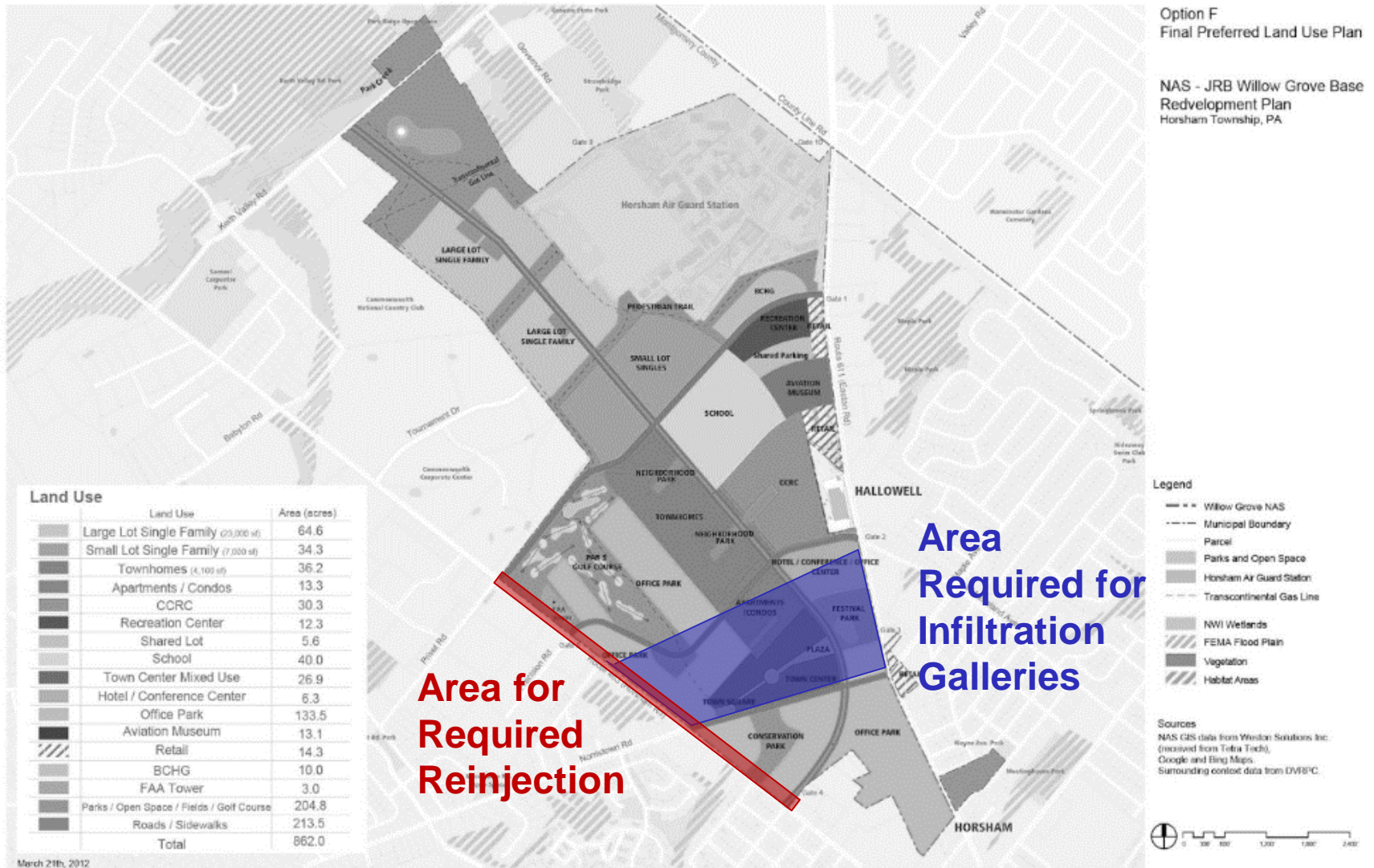
No Issue

Challenge that can be overcome

May discount technology from selection



# Land Required for Reinjection







## **Concern #2**

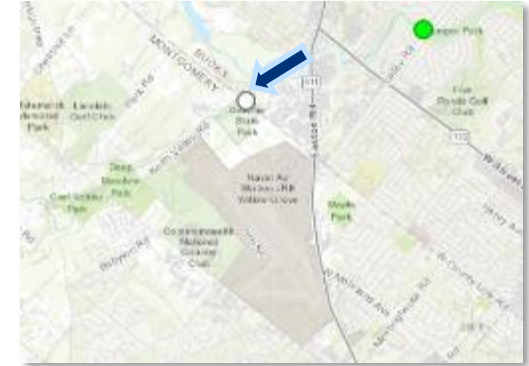
# **Contribution of GWETS Discharge to Flooding in Park Creek**



# Solution to Eliminate Contribution to Flooding in Park Creek

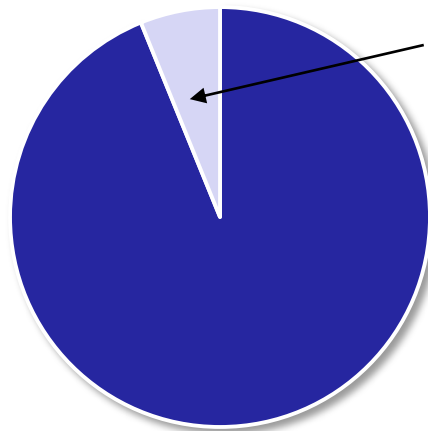


Solution: Turn system off during heavy rain events



USGS 01464899 Park Cr (SW-19) at Countyline Rd At Warminster, PA

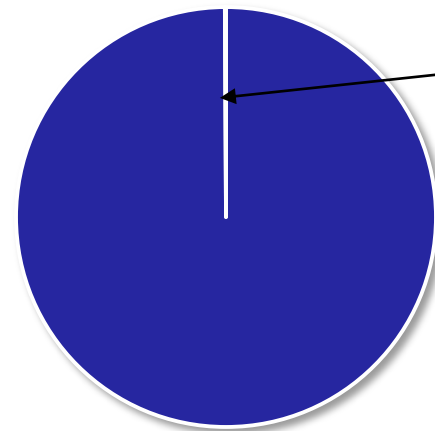
Annual Average Flow



6.5% of the flow

■ Park Creek ■ GWETS

2 Year Storm



Less than 0.1% of the flow

■ Park Creek ■ GWETS



# Next Steps



- Finalize the EE/CA.
- Hold public comment period. Comments will be address in Action Memorandum.
- Submit and finalize Action Memorandum.
- Submit NPDES Permit Equivalency Application for PADEP review.
- Consult with Delaware River Basin Commission (DRBC).
- Submit and finalize Removal Action Work Plan (RAWP/Design).
- Construction and initial testing are anticipated to take two years.



# Additional Information and Resources - Website



<https://www.bracpmo.navy.mil/BRAC-Bases/Northeast/Former-Naval-Air-Station-Joint-Reserve-Base-Willow-Grove/>

BRAC Bases > Northeast > Former Naval Air Station Joint Reserve Base Willow Grove >

## Meeting Material

Former Naval Air Station  
Joint Reserve Base  
Willow Grove

Meeting Material

Documents

Public Notices

Contact

Links

Administrative Record

Click and Subscribe to  
Updates

### Search Willow Grove Documents

[Browse Documents >](#)

#### Proposed Remedial Action Plan (PRAP) Meeting

[23 Sep 2020 PRAP Meeting Presentation for Sites 3 and 12](#)

#### Open House Meetings

[23 & 24 May 2016 Open House Meeting Posters](#)

[24 & 25 February 2015 Open House Handouts](#)

[7 October 2014 Open House Meeting Posters](#)

#### Meeting Information

All Restoration Advisory Board (RAB) Meetings are held quarterly at the Horsham Township Library.

[RAB Member Application](#)

[RAB Meeting Topic Survey Form](#)

2023 RAB Meeting Material	2022 RAB Meeting Material	2021 RAB Meeting Material
2020 RAB Meeting Material	2019 RAB Meeting Material	

[December 7, 2023 RAB Meeting Notice](#)  
[December 7, 2023 RAB Meeting Agenda](#)  
[September 14, 2023 RAB Presentation](#)

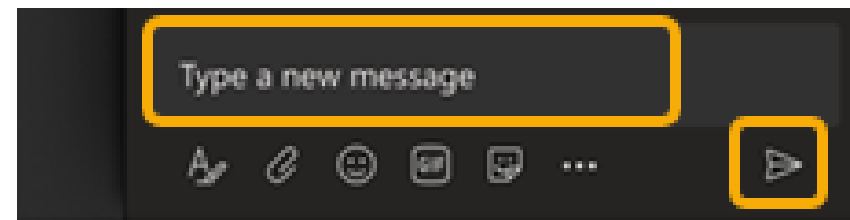
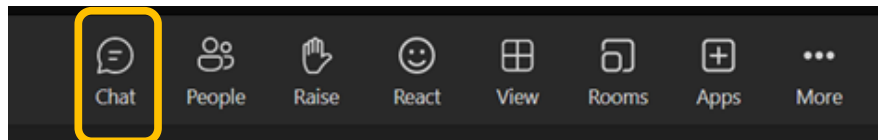
Additional weblinks for PFAS information and resources available in backup



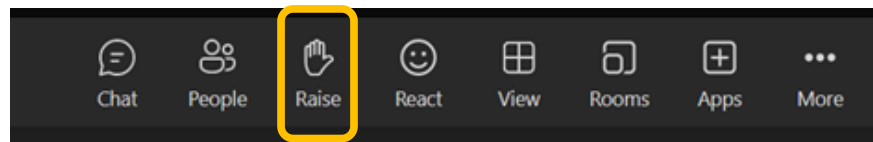
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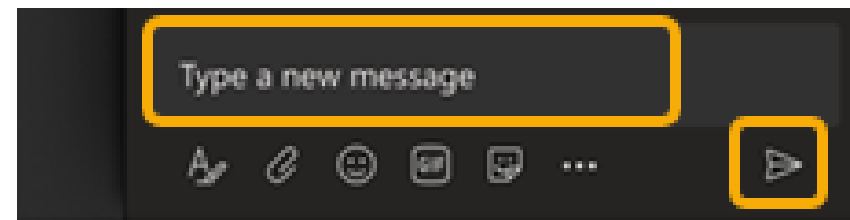
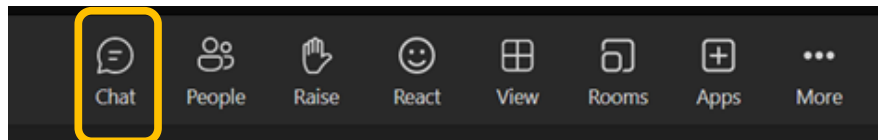
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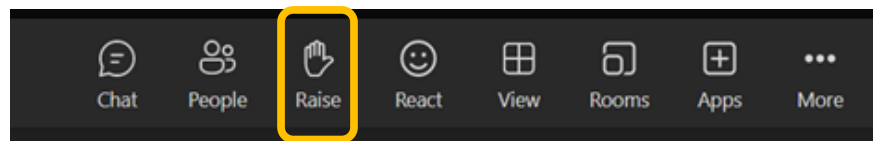
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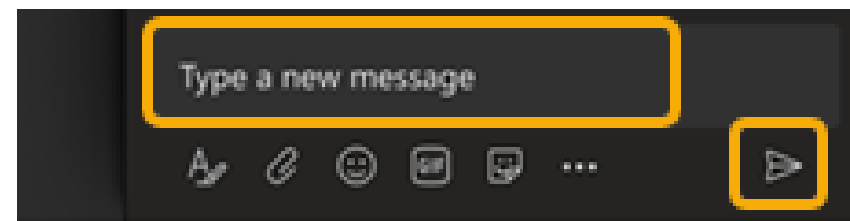
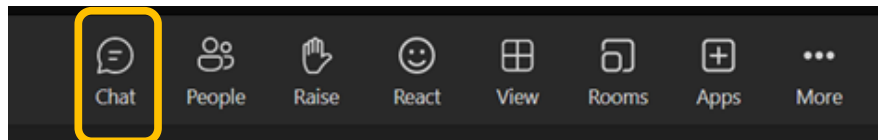
# **Environmental Protection Agency and Pennsylvania Department of Environmental Protection Comments**



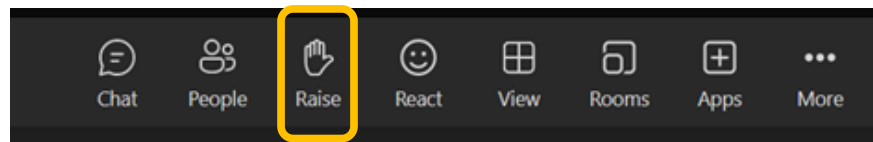
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# *For more Information*



## **RAB Navy Co-Chair**

### ***Jonathan Harris***

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[jonathan.i.harris5.civ@us.navy.mil](mailto:jonathan.i.harris5.civ@us.navy.mil)

### ***Sarah Kloss***

Remedial Project Manager  
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## **RAB Community Co-Chair**

### ***William T. Gildea-Walker***

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## **RAB ANG Co-Chair**

### ***Lt Col Brian A. Silver***

Commander, 111th Mission Support  
Group Biddle Air National Guard Base  
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DSN 358-7101  
Phone: 215-323-7101  
[brian.silver@us.af.mil](mailto:brian.silver@us.af.mil)

### ***Bill Myer, (COL Ret.), PG***

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20762  
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[william.myer.2@us.af.mil](mailto:william.myer.2@us.af.mil)





# ***Next RAB Meeting***



Next Restoration Advisory Board (RAB) meeting:  
Thursday, March 14, 2024 at 6:00 p.m.  
Hybrid Meeting Planned  
(Horsham Township Community Center)

Environmental Restoration discussions have concluded.



# Health Professional Contact Information

***Susan Wood***

***PADOH  
Per and Polyfluoroalkyl  
Substances (PFAS) Project***

*c-swood@pa.gov*

***Dr. Linda Brown***

***RTI International***

*lindabrown@rti.org  
(301) 816-4626*





**Thank you for joining the Restoration Advisory Board (RAB) meeting for the former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove and the Biddle Air National Guard Base.**

**The meeting has concluded.**



# **BACKUP / ADDITIONAL INFORMATION**



# Environmental Restoration Sites

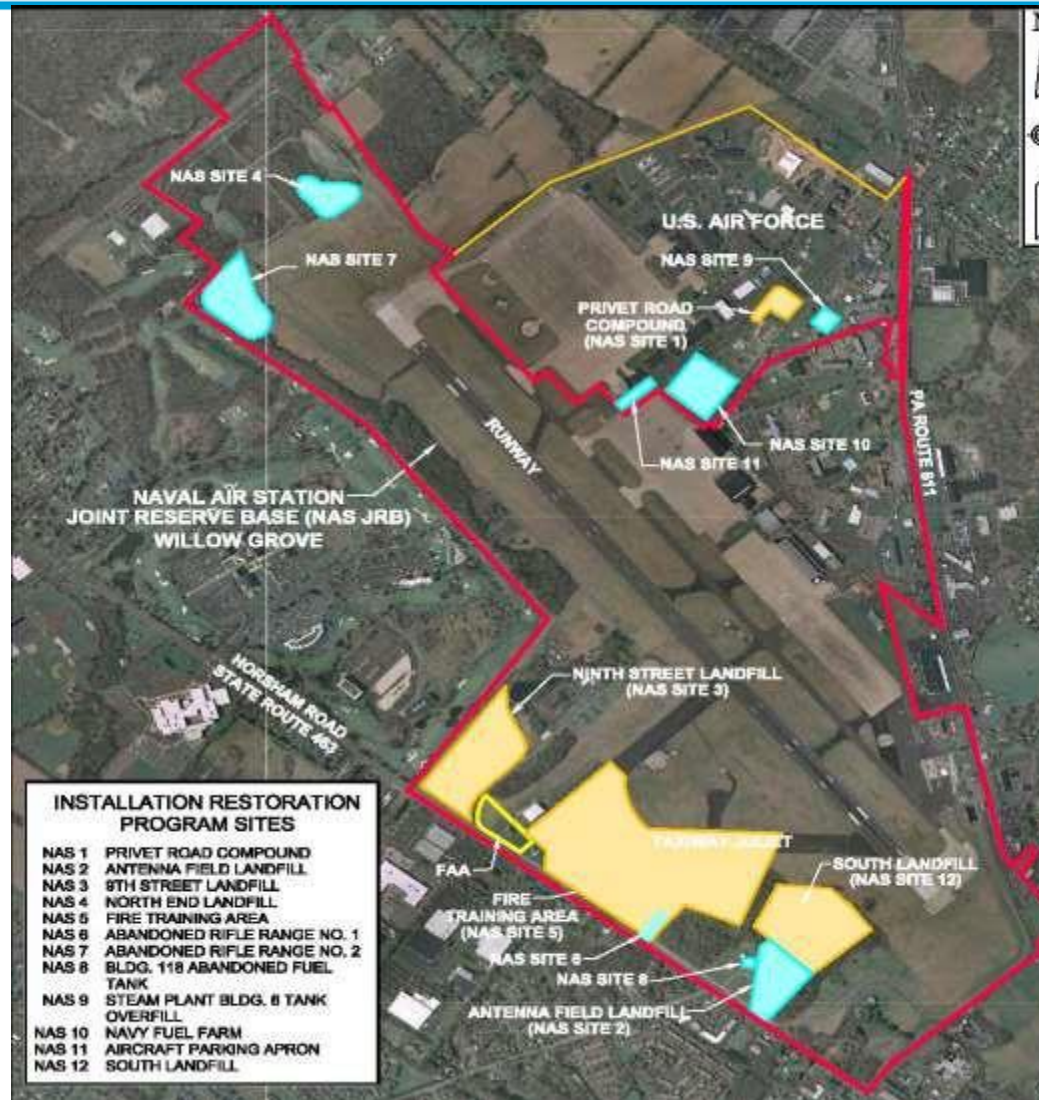


Site	Name	Operable Unit (OU)	Status
2	Antenna Field Landfill	Soil - OU 5 Groundwater - OU 9	No Action ROD Signed June 17, 2010
3	Ninth Street Landfill	Soil - OU 6 Groundwater - OU 10	RI completed October 2011. FS and PRAP completed. ROD was finalized in September 2021. RD was finalized in January 2022. RA is in progress.
4	North End Landfill	. . .	Consensus Agreement for No Action Jan. 2009
5	Fire Training Area	Soil - OU 4 Groundwater - OU 2	Soil (OU 4) NFA ROD signed September 2007 Groundwater (OU 2) ROD signed September 2012 Groundwater (OU 2) RACR signed September 2014 Groundwater (OU 2) Final OPS and OM&M Plan May 2015
6	Abandoned Rifle Range No. 1	. . .	Consensus Agreement for No Action December 2007
7	Abandoned Rifle Range No. 2	. . .	Consensus Agreement for No Action August 2008
8	Building 118 Abandoned Fuel Tank	. . .	NFA Agreement October 2006
SSA 11	Aircraft Parking Apron	. . .	Eliminated From Consideration
12	South Landfill	OU 11 (Soil)	Final RI Feb. 2014. FS and PRAP completed. ROD in progress. ROD was finalized in October 2021. RD was finalized in January 2022. RA is in progress.
		OU TBD (Groundwater)	RI is still in progress.
PFCs/PFAS	Perflourinated Compounds/Per- and Polyfluoroalkyl substances	OU 12	TCRA September 2015, Final PA/SI Mar. 2016. RI phase I completed 2019. RI phase II in progress.



# NASJRB Willow Grove

## Environmental Restoration Sites





# ***PFOA / PFOS Background***

- In mid-2014, PFAS known as perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were found in public drinking water wells near NASJRB Willow Grove through an EPA program known as the Unregulated Contaminant Monitoring Rule (UCMR).
- The health advisory levels at that time were 0.4 micrograms per liter ( $\mu\text{g/L}$ ), or 400 parts per trillion (ppt), for PFOA and 0.2  $\mu\text{g/L}$ , or 200 ppt, for PFOS.
- PFOA/PFOS are man-made chemicals used in many products, including fire-fighting solutions known as aqueous film-forming foam (AFFF), which were used at NASJRB Willow Grove.
- In the summer of 2014, the Navy began sampling for PFOA/PFOS in private drinking water wells and worked with Horsham Water and Sewer Authority (HWSA) on the municipal drinking water wells.



# ***PFOA / PFOS Background (cont.)***



- In May 2016, the Environmental Protection Agency established a lifetime Health Advisory (HA) level of 70 ppt (0.07 µg/L) for combined PFOA and PFOS.
- The Navy's priority continues to be eliminating exposure to PFOA/PFOS above health advisory levels in drinking water.
- Any health concerns should be addressed with your health professional. Weblinks to health information is provided at the end of this presentation.



# ***Removal (Interim) Actions for PFOA / PFOS***

- PFOA and PFOS above the EPA provisional health advisory (PHA) levels in drinking water sources (2015). The PHA levels were 0.4 µg/L, or 400 ppt, for PFOA and 0.2 µg/L, or 200 ppt, for PFOS.
- PFOA and PFOS above the EPA lifetime health advisory levels in private drinking water sources (2017).
- PFOA and PFOS above the EPA lifetime health advisory levels in municipal drinking water sources (2017).
- Removal of soils containing PFOS exceeding project screening levels (2018).
- Other interim actions to reduce PFOA and PFOS in drinking water sources are being considered.

The interim action memorandums are available in the administrative record



# ***Phase I PFAS Investigation Summary***

- Soil, groundwater, and surface water samples were collected in potential sources area.
- Human health screening assessment:
  - PFOS or PFOA sample results exceeding screening levels were detected in the soil, groundwater, and surface water.
  - PFBS sample results did not previously exceed screening levels for soil, groundwater, and surface water. However, PFBS sample results exceed the new screening level in groundwater based on updated toxicity values (May 2021)

Download available from Administrative record or the  
Horsham Township Library Information Repository



# ***Phase I PFAS Investigation Summary***

*(cont.)*



- Ecological screening assessments:
  - Screening levels for PFAS have not been developed by EPA, so the Navy identified criteria and performed the screening assessment based on a review of available literature. Screening levels were updated in January 2021 with new data available.
  - In sediments:
    - PFOA exceeds screening levels for invertebrate and wildlife.
    - PFOS exceeds screening levels for wildlife at one location.
  - In surface water:
    - PFOS exceeds screening levels for aquatic organisms and wildlife.
  - In soil:
    - PFOS exceeds screening levels.



# ***Phase II PFAS Investigation***

## ***PlumeStop Design Verification Test (DVT)***



- A workplan for a PlumeStop Design Verification Test (DVT) at the Northern Ponding Area was submitted to the EPA and PADEP in January 2020. The purpose of the study is to evaluate the feasibility of PlumeStop as a permeable reactive barrier (PRB) along the Keith Valley Road property line.
- PlumeStop is an in-situ (in ground) technology composed of very fine particles of activated carbon suspended in water using unique organic polymer dispersion chemistry.
- The test is planned for a phased approach:
  - Phase I - Overburden groundwater and soil study
  - Phase II - PlumeStop injection test
- Phase I occurred in late March 2020. A draft technical memo summarizing Phase I results and the revised workplan for the injection test is currently under regulatory review.



# Stormwater System Evaluation



- The NASJRB storm water system was evaluated to locate portions where PFAS impacted groundwater may infiltrate and discharge to surface water. Over four miles of storm sewer lines reviewed, using remote video inspections.
- A Tech Memo with recommended repairs was finalized in July 2020.
  - Joint Rehabilitation on 6,136 LF of concrete pipe (cleaning, joint sealing, testing)
  - Abandonment of four pipes and three structures
  - Replacement of 201 LF of 24" metal pipe
- Repairs were completed in October 2021.



# ***PFAS Information and Resources***



## **Department of the Navy (DON) Perfluorinated Compounds (PFC)/PFAS website**

[https://www.secnav.navy.mil/eie/Pages/PFAS\\_Home.aspx](https://www.secnav.navy.mil/eie/Pages/PFAS_Home.aspx)

## **NAVFAC BRAC PMO Websites** (includes links to environmental information and the administrative record):

<https://www.bracpmo.navy.mil/BRAC-Bases/Northeast/Former-Naval-Air-Station-Joint-Reserve-Base-Willow-Grove/Documents/>

<https://www.bracpmo.navy.mil/BRAC-Bases/Northeast/Former-Naval-Air-Warfare-Center-Warminster/Documents/>

A subscription service is available on the BRAC PMO websites to receive e-mail notification of new information.



# ***PFAS Information and Resources (continued)***



## **Environmental Protection Agency**

<https://www.epa.gov/pfas>

## **Agency for Toxic Substances and Disease Registry**

<https://atsdr.cdc.gov/pfas/index.html>

## **Pennsylvania Department of Environmental Protection**

[https://www.dep.pa.gov/Citizens/My-Water/drinking\\_water/Pages/default.aspx](https://www.dep.pa.gov/Citizens/My-Water/drinking_water/Pages/default.aspx)

## **Horsham Township**

<https://horsham.org/>

## **Warminster Township**

<https://warminstertownship.org/>



# ***PFAS Information and Resources (continued)***



## **Horsham Water and Sewer Authority**

<https://www.horshamwater-sewer.com>

## **Warminster Township Municipal Authority**

<https://www.warminsterauthority.com/>

## **Warwick Township Water and Sewer Authority**

<https://wtwsa.org/>

## **Pennsylvania Department of Health**

<https://www.health.pa.gov/topics/envirohealth/Pages/PFAS.aspx>



# Participation in DoD Funded PFAS Research

- SERDP/ESTCP are DoD-funded environmental research programs.
- NAWC Warminster and NASJRB Willow Grove is supporting ~\$9M of SERDP/ESTCP funded research investigating new PFAS assessment and remediation technologies.
- Will continue to seek participation in additional SERDP/ESTCP work at NASJRB Willow Grove or nearby NAWC Warminster.
- Participate in other Navy or USEPA funded research.

## SERDP/ESTCP Projects and organizations leading the research:

- **Soil or Groundwater Treatment**
  - 13 Total Projects Participated, projects since last RAB
    - ER18-1300 –College of Wooster  
Completed pilot column study with new absorption media in March/April 2020.
    - ER18-1063 – Colorado School of Mines  
Pilot column testing of different commercial resins to commence in late June at WG
- **Passive Treatment of Storm Water**
  - ER18-1230 –Oregon St. Univ.
- **Assessment of Fate and Transport of PFAS in Surface Water**
  - ER19-1073 (New Start) –Academy of Natural Sciences of Drexel University
  - ER19-1193 (New Start and potential participation) –Towson State University

## **DoD's SERDP/ESTCP PFAS website:**

[https://map.serdp-estcp.org/Featured-Initiatives/Per-and-Polyfluoroalkyl-Substances-PFASs/pfas\\_efforts.pdf](https://map.serdp-estcp.org/Featured-Initiatives/Per-and-Polyfluoroalkyl-Substances-PFASs/pfas_efforts.pdf)



# **EE/CA BACKUP INFORMATION**

## **September 14, 2023**

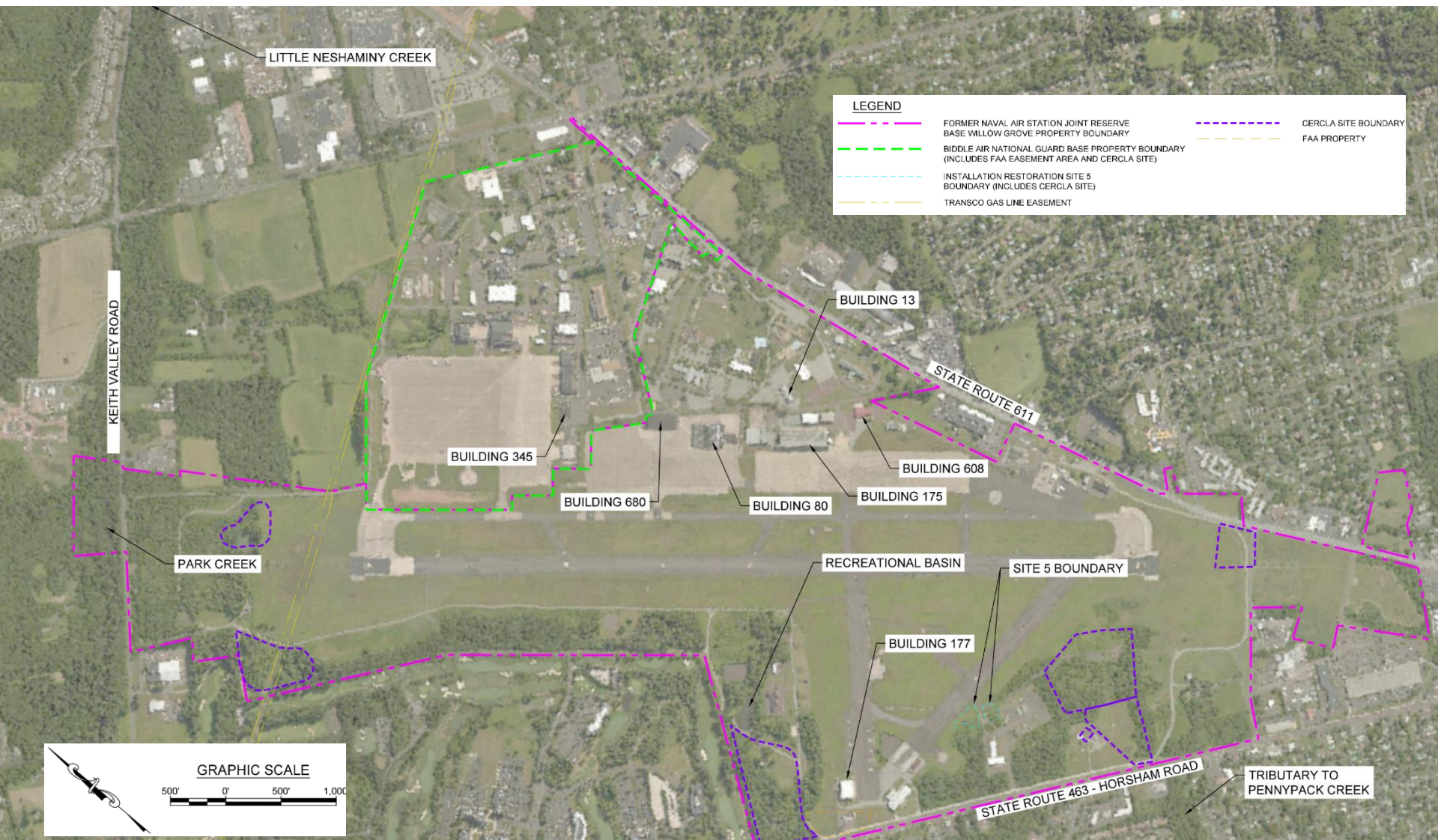


# ***Treatment Technology Alternatives – “T” Alternatives***



- Alternative T1: No action
- Alternative T2: Treatment system with granular activated carbon (GAC)
- Alternative T3: Treatment system using GAC and single-use ion exchange (IX) resin
- Alternative T4: Treatment system using GAC and regenerable IX resin



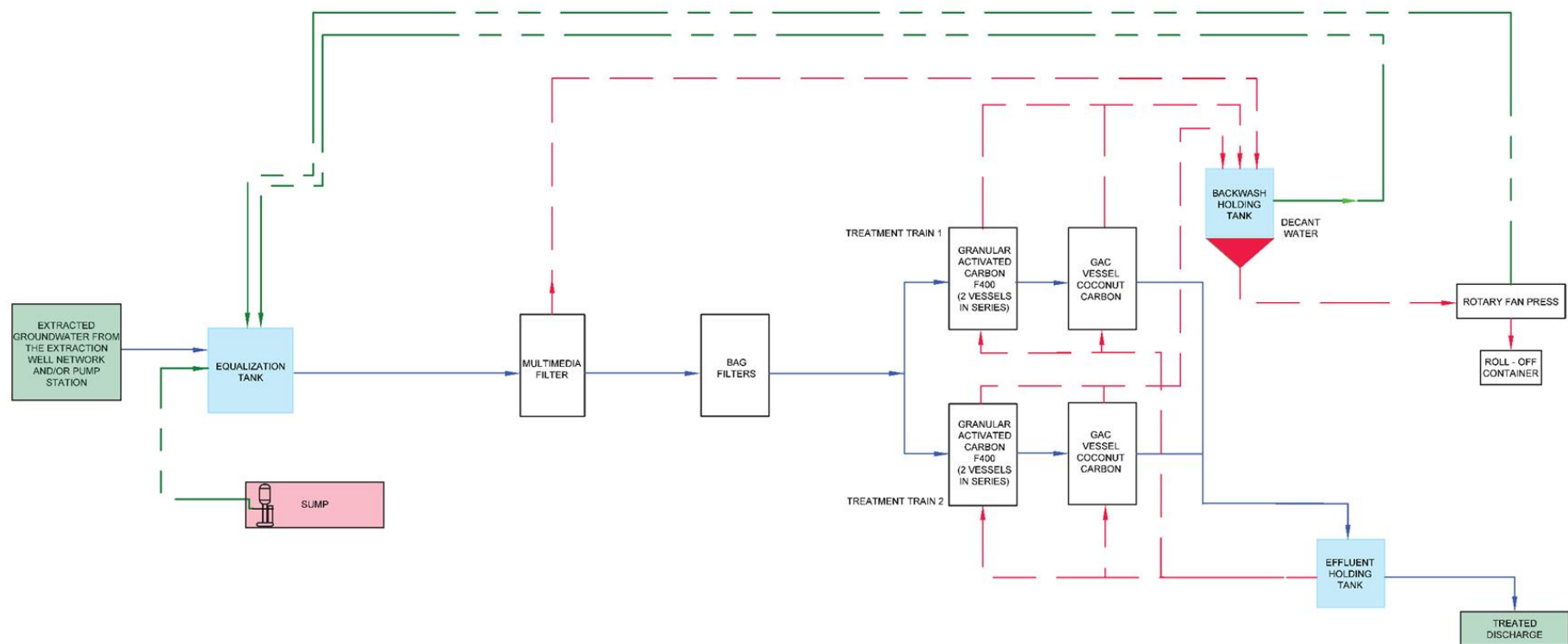
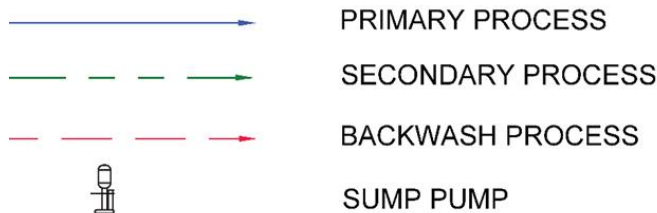




# Alternative T2: Treatment system with GAC



## LEGEND

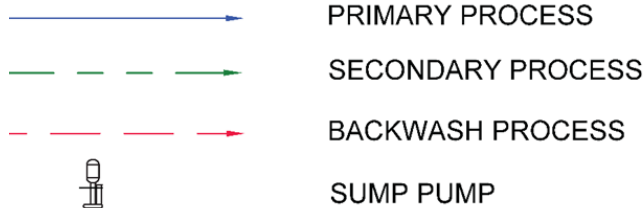




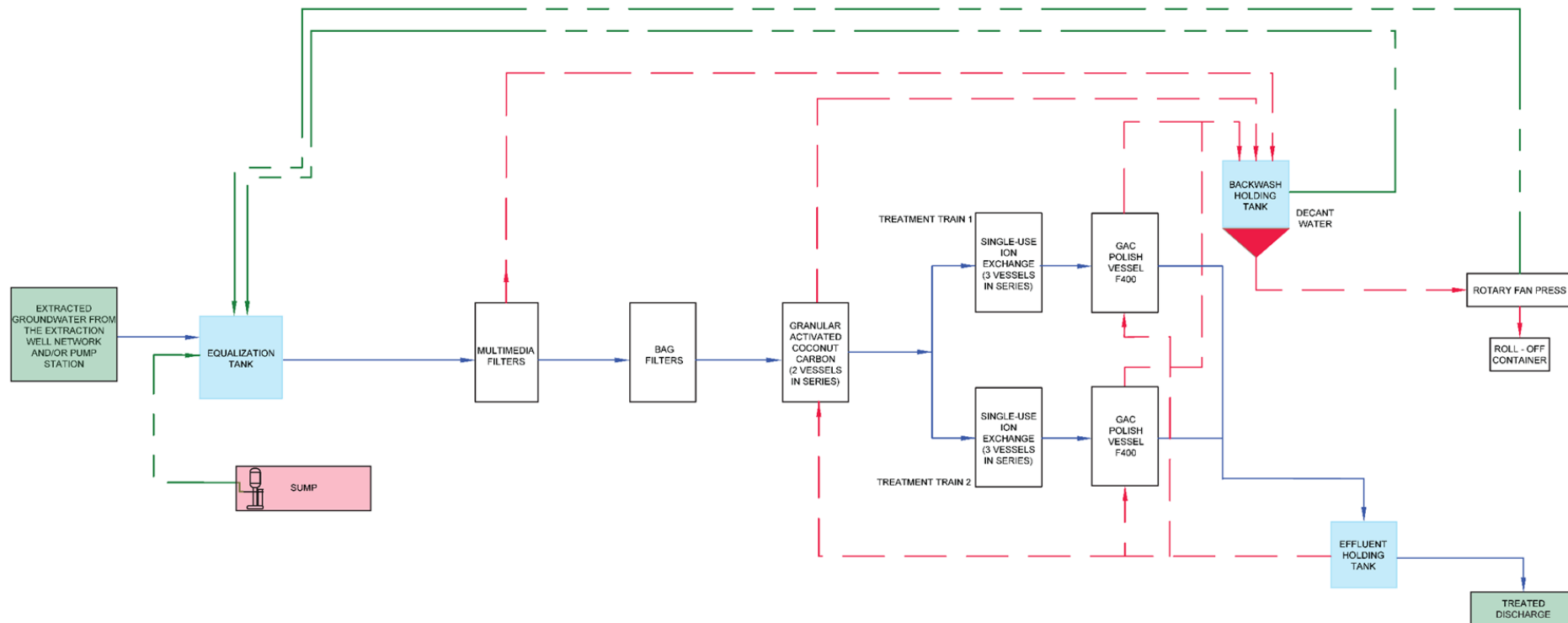
# Alternative T3: Treatment System using GAC and Single-Use IX Resin



## LEGEND



## RECOMMENDED ALTERNATIVE



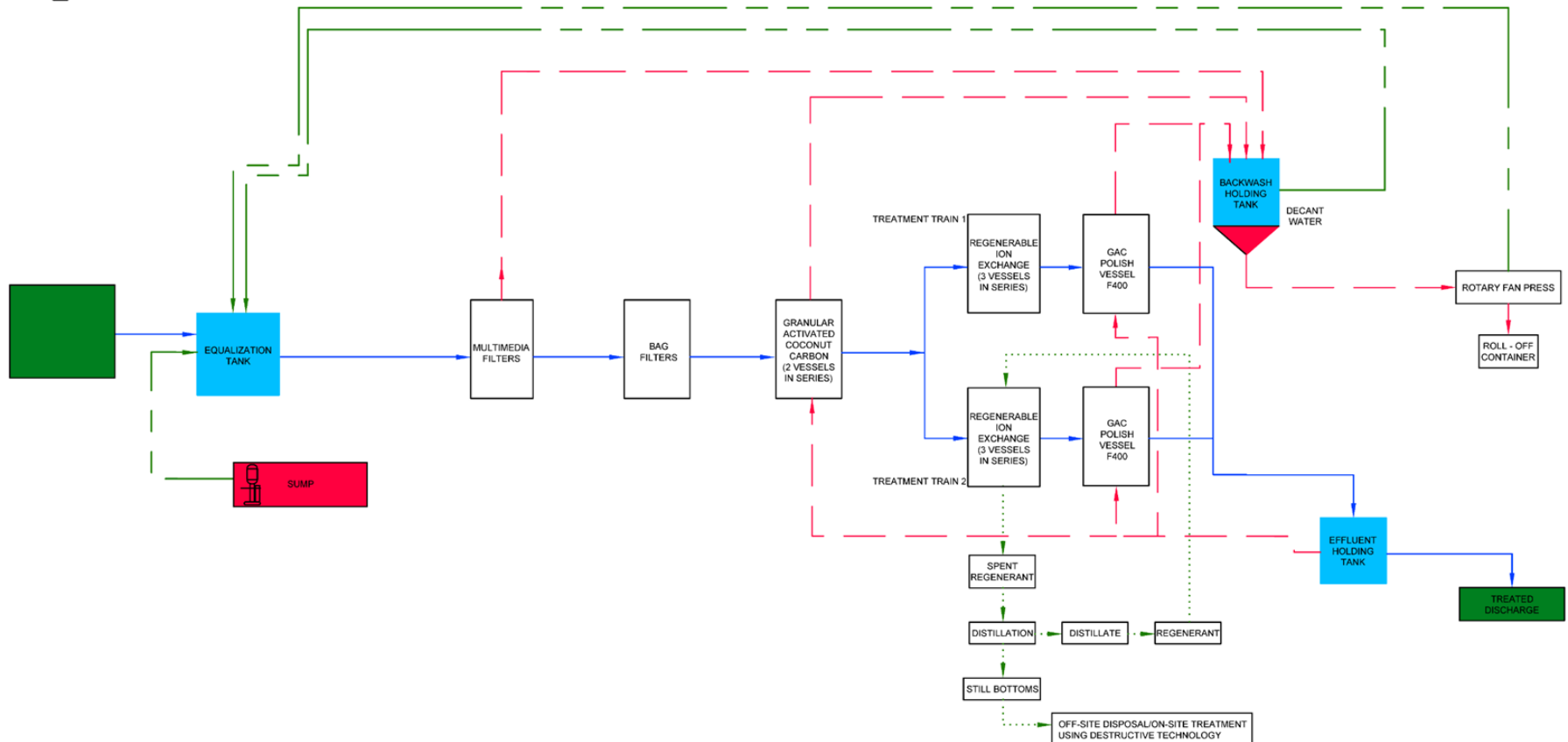


# Alternative T4: Treatment System using GAC and Regenerable IX Resin



## LEGEND

- PRIMARY PROCESS
- - -→ SECONDARY PROCESS
- - -→ BACKWASH PROCESS
- · ·→ REGENERATION PROCESS (1 VESSEL AT A TIME)
- SUMP PUMP





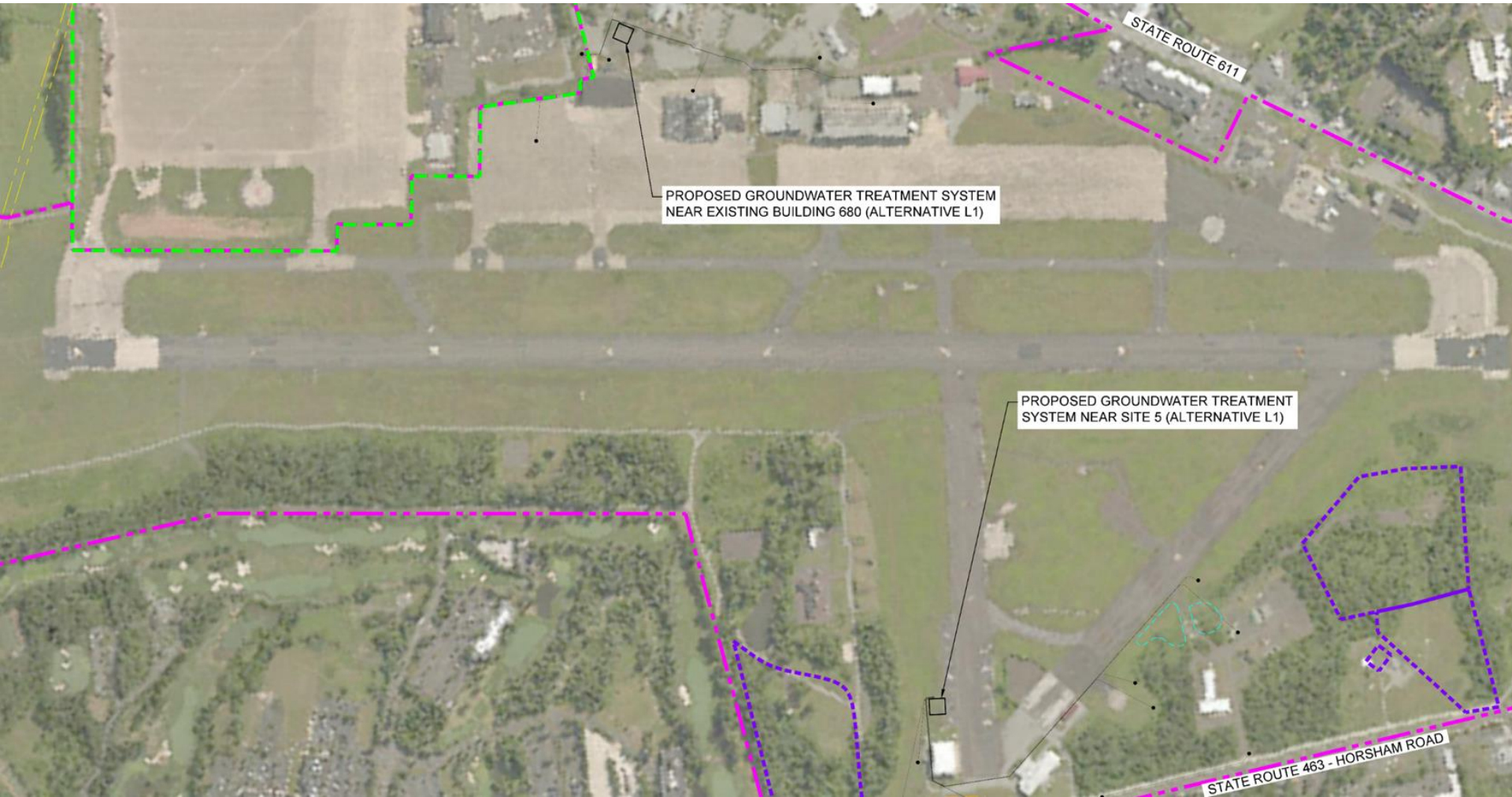
# ***Building Location Alternatives – “L” Alternatives***



- Alternative 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
- 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

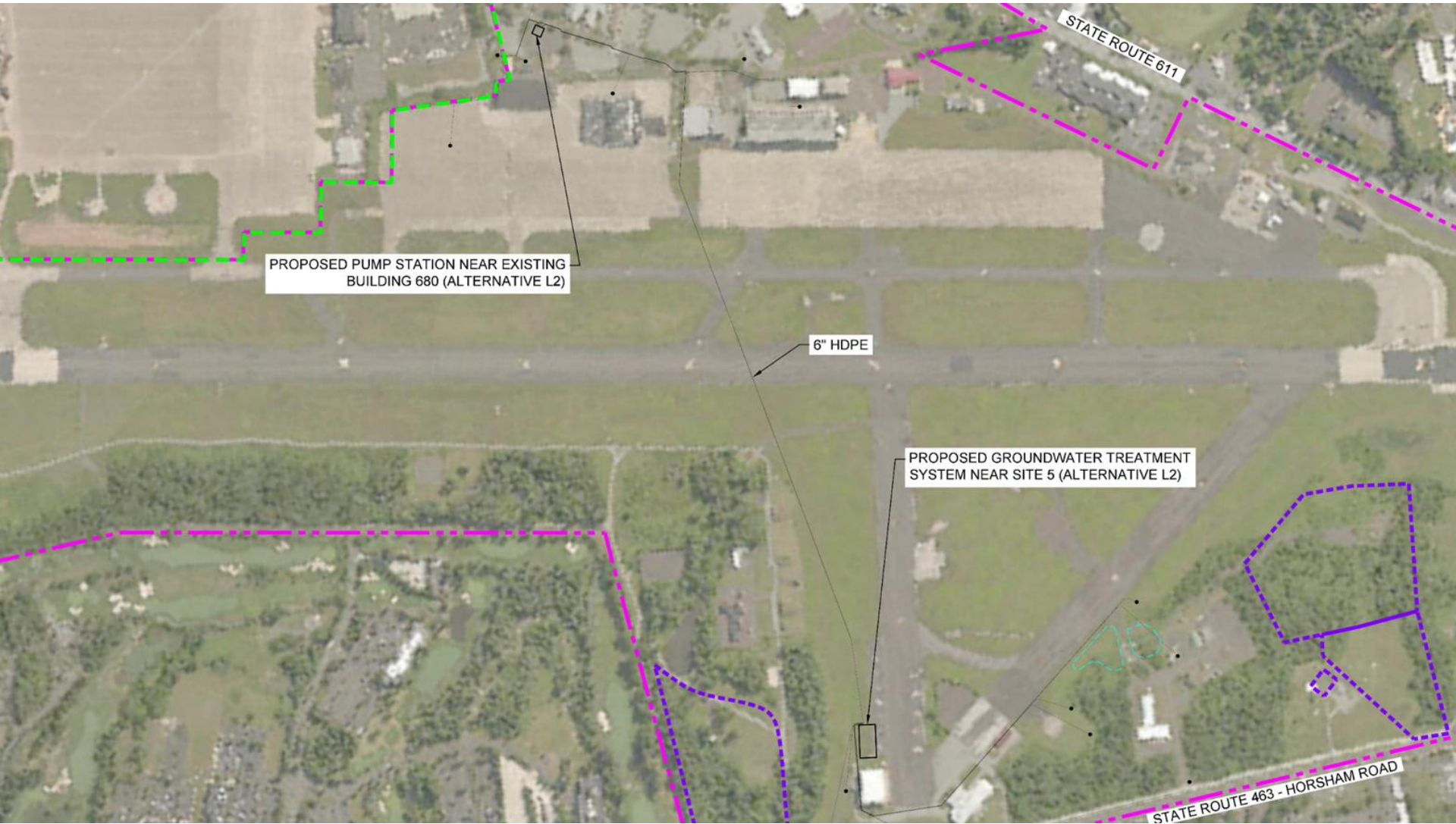


# Alternative L1: GWTS and Pump Station Locations



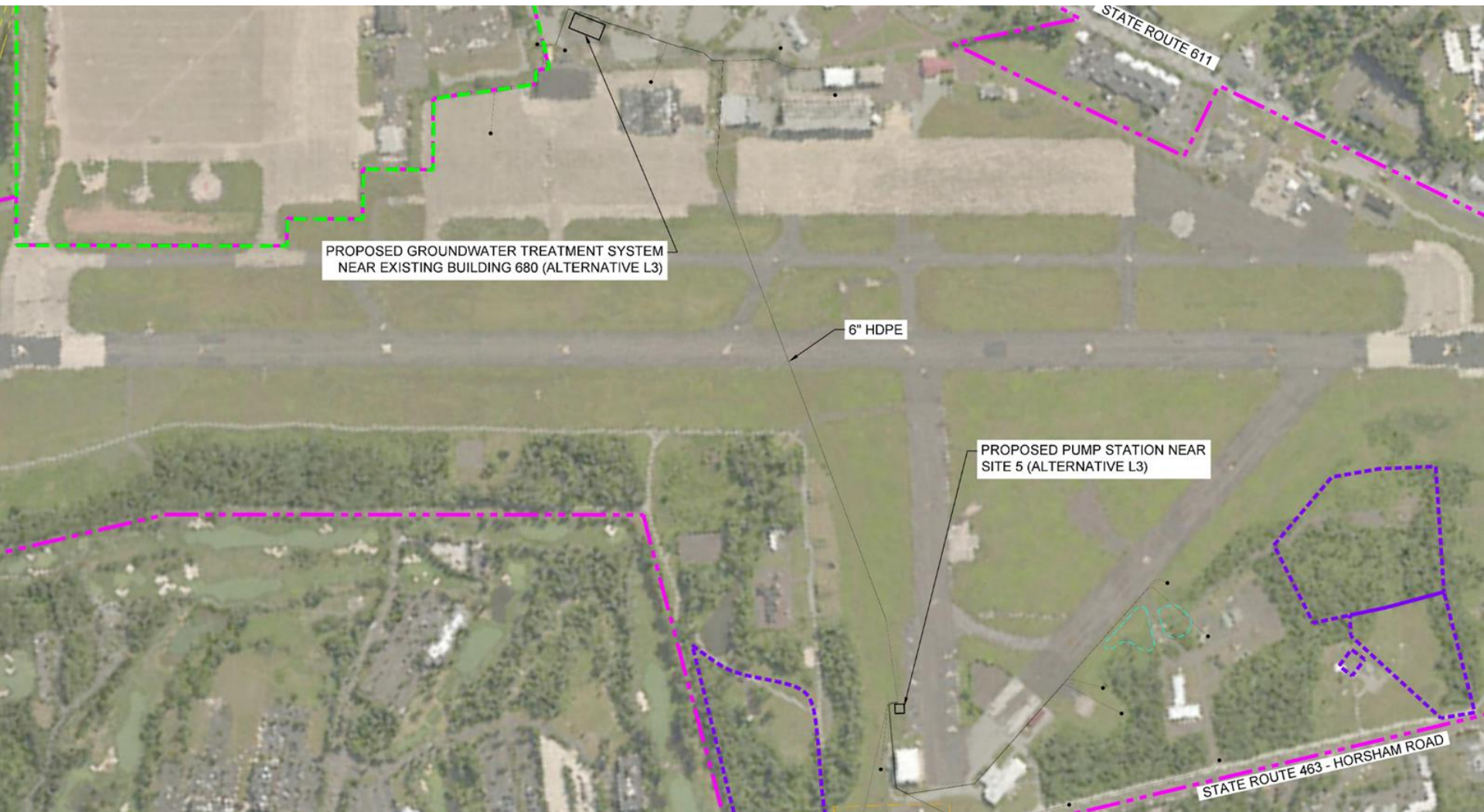


# Alternative L2: GWTS and Pump Station Locations





# Alternative L3: GWTS and Pump Station Locations



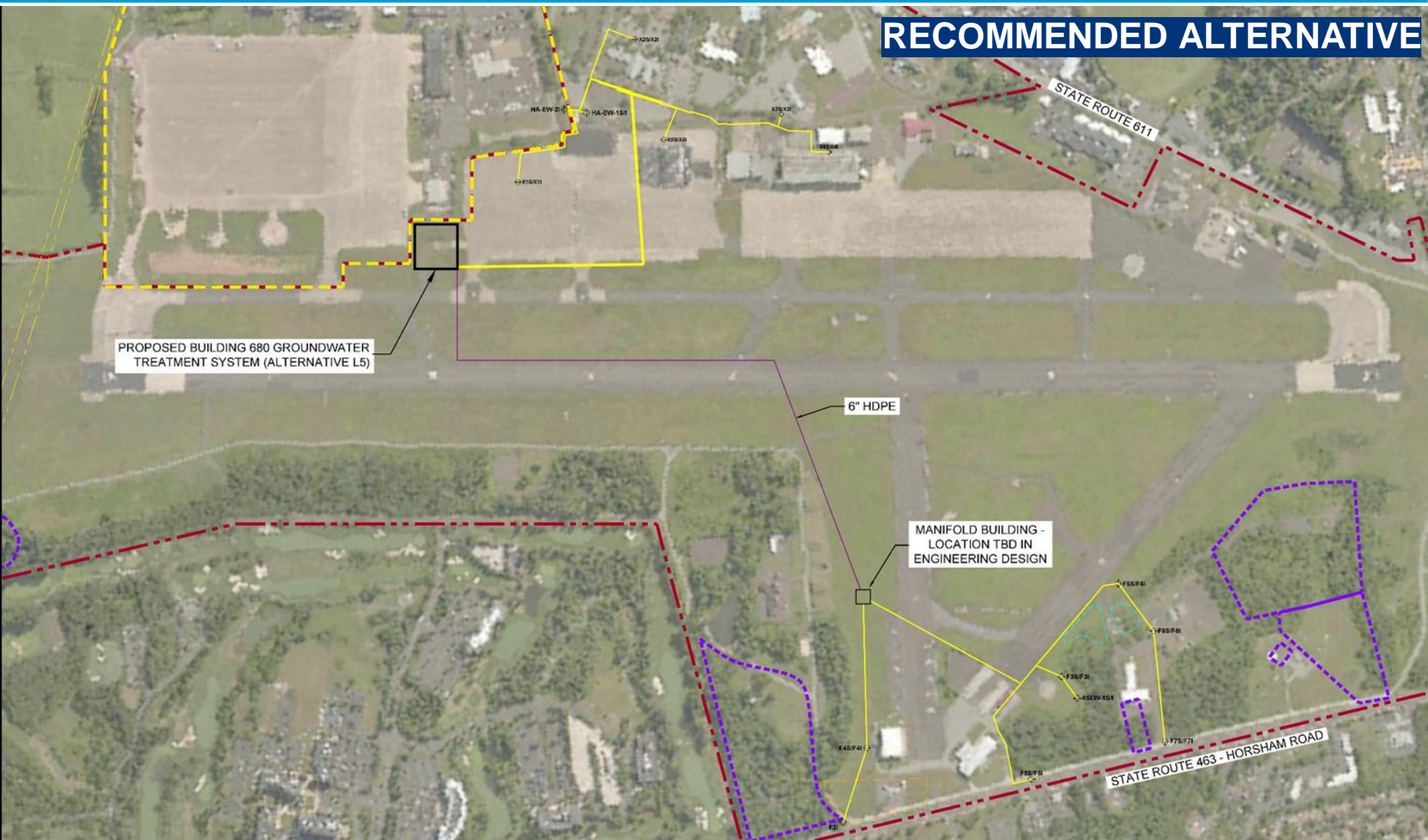


# Alternative L4: GWTS and Pump Station Locations





# Alternative L5: GWTS and Manifold Building Locations





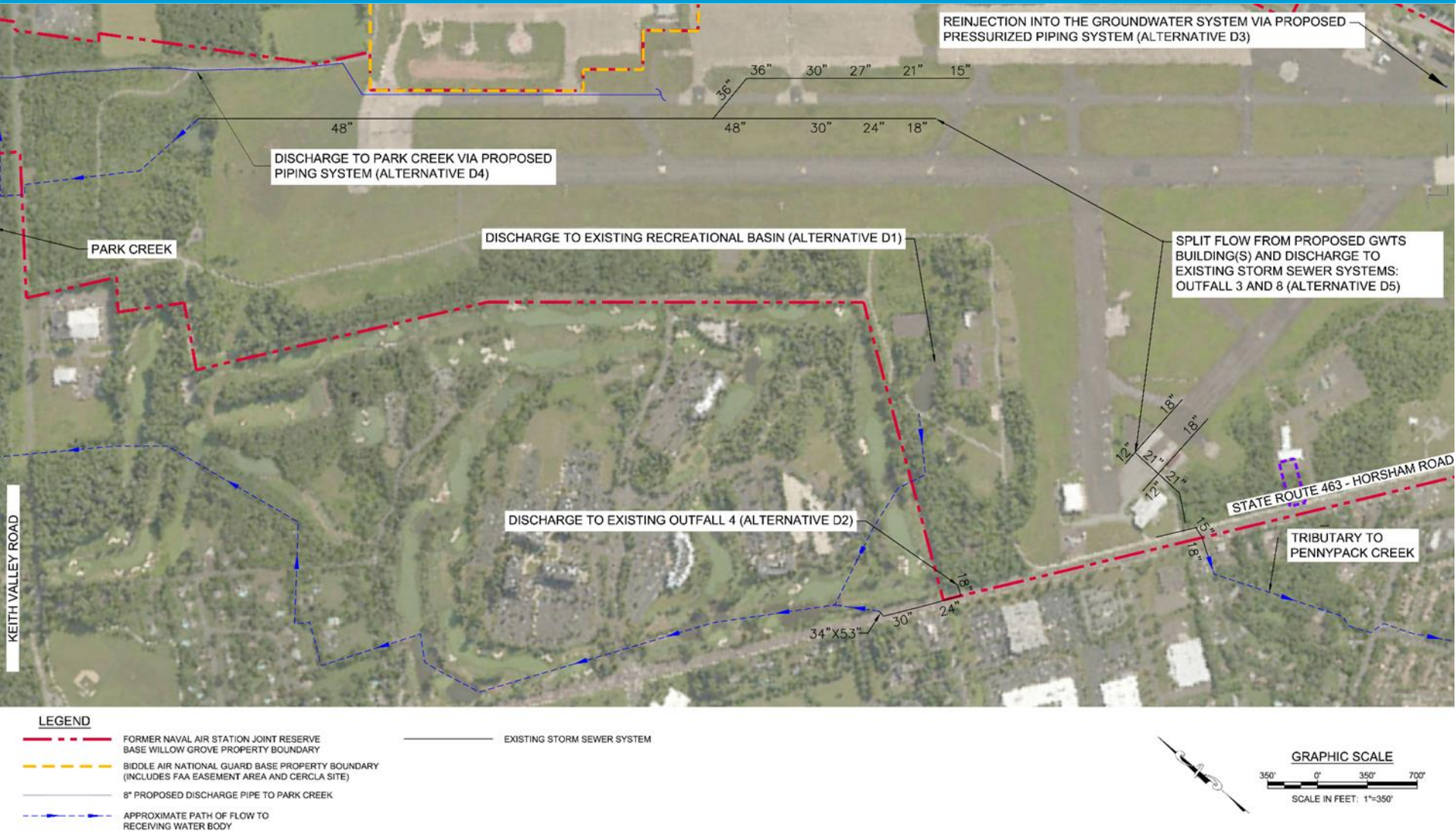
# ***Discharge Location Alternatives – “D” Alternatives***



- 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 via a new piping system (not relying to the existing system)
- Alternative D5: Discharge to two existing storm sewer systems: Outfall 3 and Outfall 8

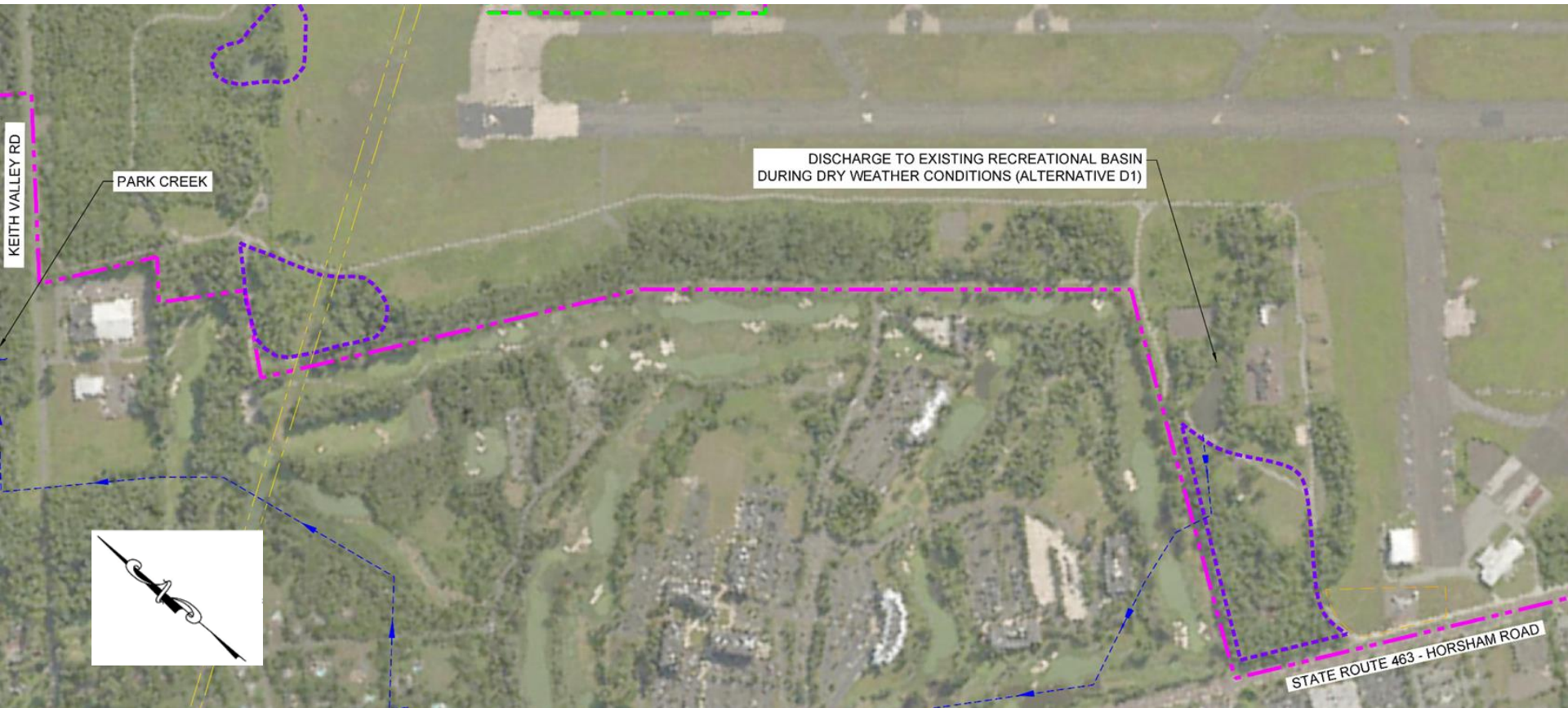


# Discharge Location Alternatives – Summary



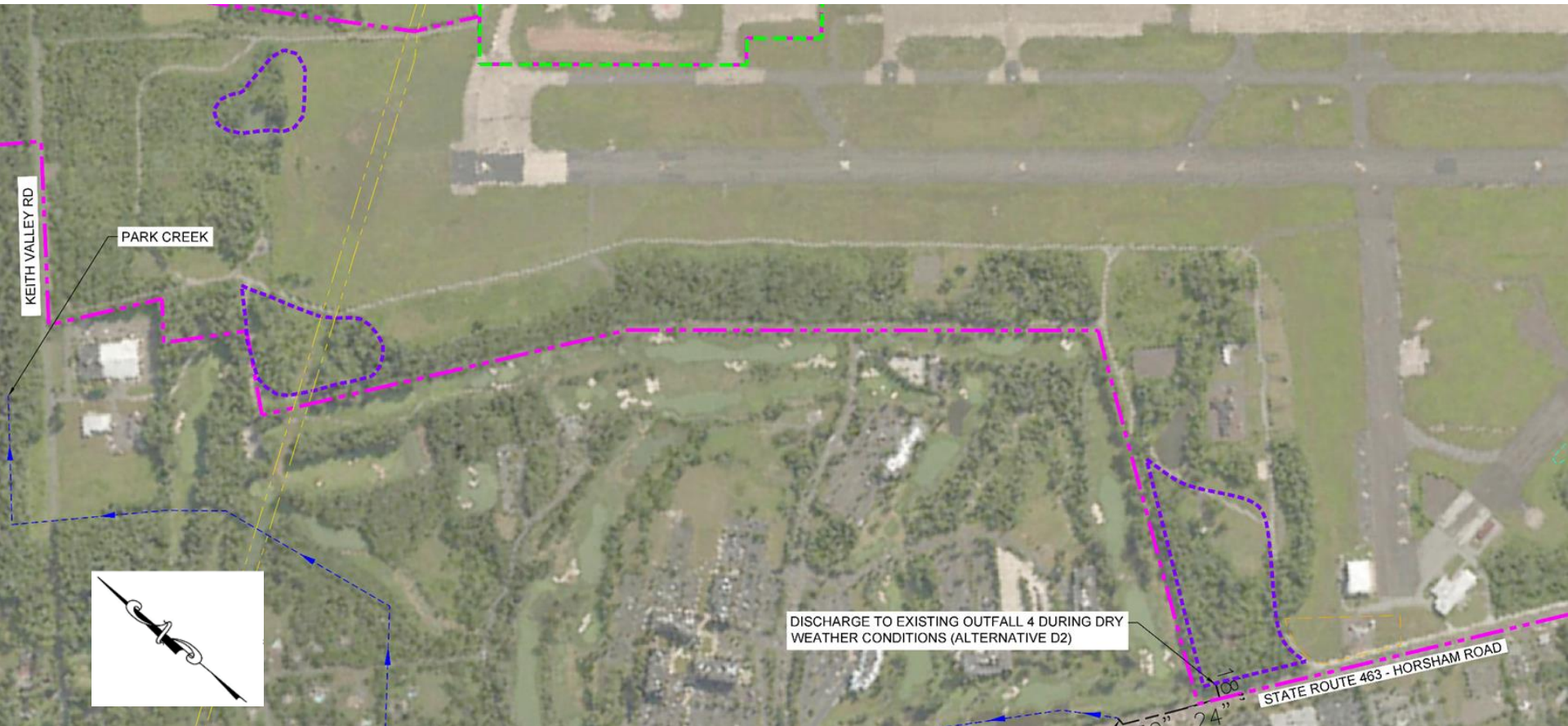


# Alternative D1: Discharge Location – Recreational Basin





# Alternative D2: Discharge Location – Outfall 4





# Alternative D3: Reinjection into the Groundwater System



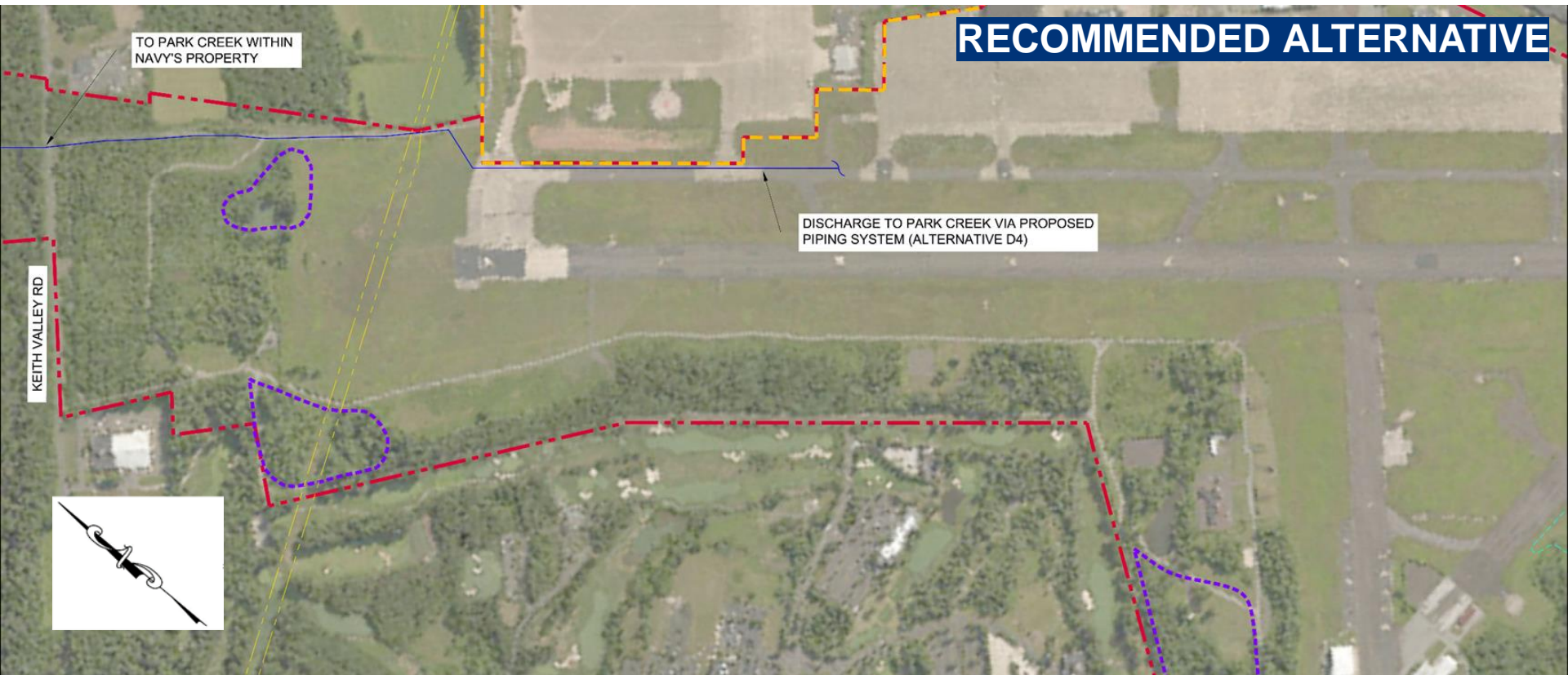
REINJECTION INTO THE GROUNDWATER SYSTEM IN A GREEN SPACE SET ASIDE FOR USE AS A PARK IN — THE NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE REDEVELOPMENT PLAN (ALTERNATIVE D3)

CONNECTION POINT FROM PROPOSED GWTS BUILDING(S) TO REINJECTION SITE (ALTERNATIVE D3)

STATE ROUTE 463 - HORSHAM ROAD

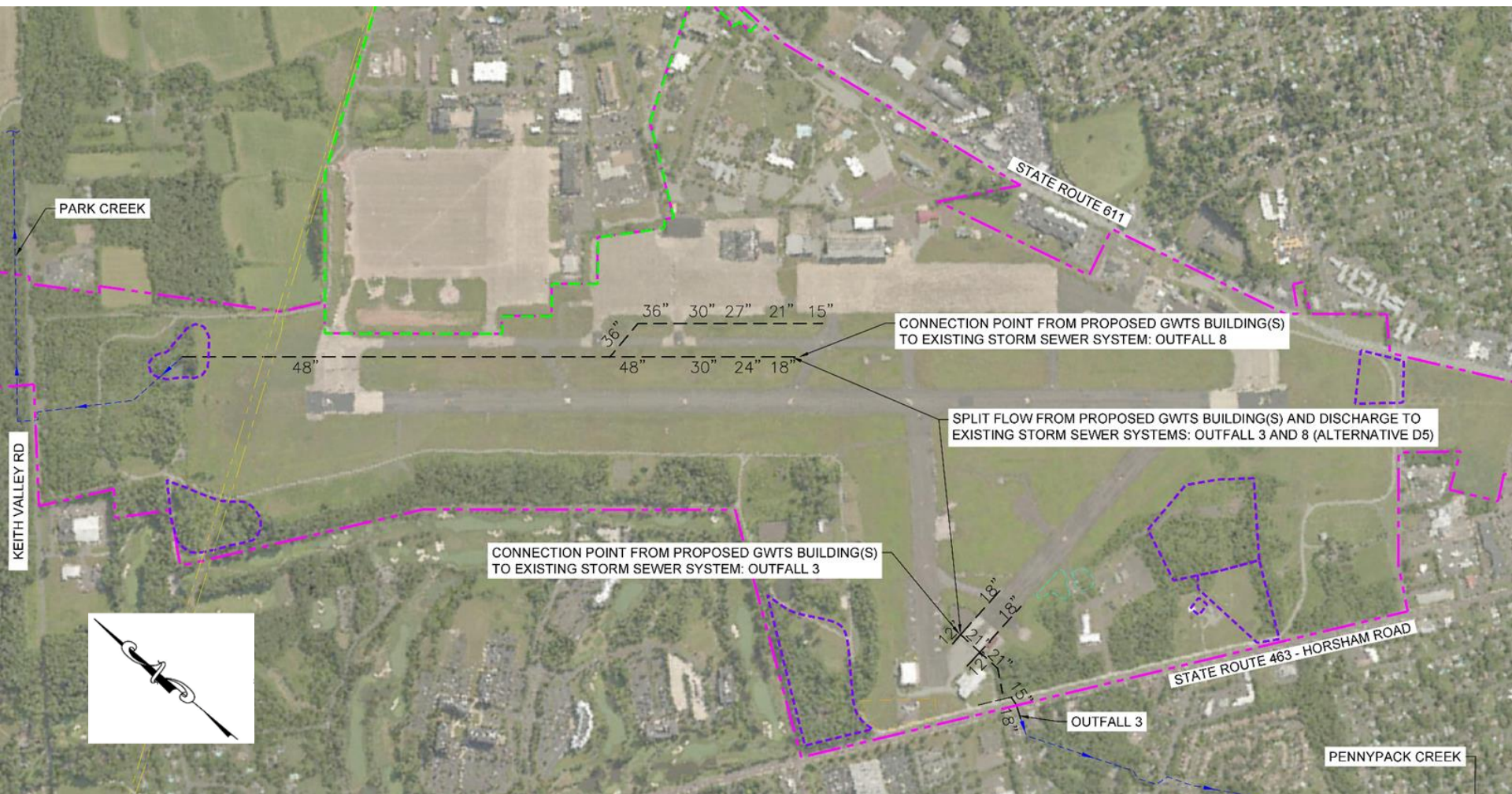


# Alternative D4: Discharge to Park Creek via a new piping system





# Alternative D5: Discharge to two existing storm sewer systems: Outfall 3 and Outfall 8





# Treatment Alternative Summary



Alternative	Description	Construction	Annual O&M	Net Present Worth
<b>Treatment (One 500 GPM System, for Two 250 GPM Systems for "L1" Multiply by 1.32)</b>				
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 Location Alternative Cost Summary



Alternative	Description	Construction	Annual O&M	Net Present Worth
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	\$ 217,393	\$ 11,757,029
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



# Location Alternative Cost Summary



Alternative	Description	Construction	Annual O&M	Net Present Worth
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



# T2 - Net Present Worth

## Treatment Alternative Cost Alternatives Summary



	D1	D2	D3	D4	D5
L1	\$ 60,760,345	\$ 60,555,789	\$ 61,277,514	\$ 60,616,294	\$ 62,793,674
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 - Net Present Worth

## Treatment Alternative Cost Alternatives Summary



	D1	D2	D3	D4	D5
L1	\$ 57,123,540	\$ 56,918,984	\$ 57,640,708	\$ 56,979,488	\$ 59,156,869
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 - Net Present Worth

## Treatment Alternative Cost Alternatives Summary



	D1	D2	D3	D4	D5
L1	\$ 60,760,345	\$ 60,555,789	\$ 61,277,514	\$ 60,616,294	\$ 62,793,674
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