NAVAL AIR STATION JOINT RESERVE BASE (NAS JRB) WILLOW GROVE
Restoration Advisory Board (RAB) Meeting Minutes

Meeting Date: December 4, 2019
Meeting Time: 6:00 p.m.
Meeting Place: Horsham Township Library

	Name	Organization
Attendance:	Willington Lin (R)	Department of Navy (Navy) Base Realignment and Closure (BRAC) Program Management Office (PMO)
	Brian Helland (R)	Navy BRAC PMO
	Greg Preston	Navy BRAC PMO
	Jennifer Good	Navy BRAC PMO
	Sarah Kloss (R)	Environmental Protection Agency (EPA) Region 3
	Deborah Goldblum	EPA Region 3
	Larry Brown	EPA Region 3
	Mark Leipert	EPA Region 3
	Kathy Davies	EPA Region 3
	Rick Rodgers	EPA Region 3
	Colin Wade (R)	Pennsylvania Department of Environmental Projection (PADEP) Southwest
	Rob Fogel	PADEP Southwest
	Bonnie McClennen	PADEP Southwest
	Bill Burger	Tetra Tech
	Tricia Moore	Tetra Tech
	John Trepanowski	Tetra Tech
	Chris Botzum	Air National Guard (ANG)
	Keith Freihofer	ANG
	Will Acosta (R)	ANG
	Lt. Col. Jacqueline Siciliano	ANG
	Lora Werner	Agency for Toxic Substances and Disease Registry (ATSDR)
	Kyle Shmeck	Montgomery County Health Department
	Mike Pickel	Horsham Water and Sewer Authority (HWSA)
	Tina O'Rourke	Horsham Water and Sewer Authority
	Tom Ames	Horsham Land Redevelopment Authority (HLRA)
	Larry Burns	HLRA
	Bill Walker	Horsham Township Council
	Bill Gallagher	Horsham Township Council
	Greg Nesbitt	Horsham Township Council
	Todd Stephens	Pennsylvania House of Representatives
	Shea Baversmith	Rep. Stephens' Office

Sean O'Connor	Rep. Schroeder's Office
Kathleen Joyce	Rep. Dean's Office
Rocco Mercuri	Gilmore Associates, Inc.
Dave Sherman	Geosyntec Consultants
Charles Hertz	Aqua America
Lisa Senior	United States Geological Survey (USGS)
Dan Goode	USGS
Timothy Runkle	Leidos
Matt Vest	Leidos
Robin Wilson	Temple University
Joseph McGrath (R)	Restoration Advisory Board (RAB), former employee and veteran
Ted Roth (R)	RAB
Corina Fiore	Hatboro-Horsham High School
David Jordan	Resident
Other Unidentified Attendees	

(R) Designates RAB Member

Willie Lin, the Navy's BRAC Environmental Coordinator and RAB Co-Chair, opened the meeting by greeting the attendees. Mr. Lin noted that the meeting would include presentations from the Navy, ANG, USGS, EPA, and PADEP. Mr. Lin asked RAB members and government representatives to introduce themselves.

Mr. Lin informed the attendees that the handouts with the presentations and an EPA fact sheet are available. Mr. Lin also noted that representatives from the ATSRD are scheduled after the RAB meeting to discuss health concerns. Mr. Lin also noted changes to the format of the Navy presentation in response to comments received during the previous RAB meeting. The presentation format identifies the most current actions, while background information has been moved to the back of the handout.

Tricia Moore commenced with the Navy presentation. Ms. Moore provided an update on the cleanup sites, including landfill Sites 3 and 12, and Site 5, the former Fire Training Area. Ms. Moore provided background on Sites 3 and 12 stating that they were former landfills used by the Public Works Department. Final draft Proposed Remedial Action Plans (PRAPs) at both Sites 3 and 12 have been completed submitted to the EPA and PADEP for review. A public comment period will occur once the document has gone through regulatory review and been published.

Ms. Moore discussed the remediation for Site 5 groundwater. The site was a former fire training area where solvents were stored and burned. An active anaerobic bioremediation system is in place to reduce the parent compounds trichloroethene (TCE) and perchloroethylene (PCE). The annual monitoring sampling concluded in May 2019. Monitoring results show good conditions for bioremediation and a reduction in concentrations of volatile organic compounds (VOCs). Additional injections of amendments for the treatment system were started in August 2019 and completed in October 2019. The reduction of VOCs has continued to be observed.

Mr. Lin began the presentation for the next agenda item per- and polyfluoroalkyl substances (PFAS). Mr. Lin provided a summary of the Navy's funding support for the HWSA. Mr. Lin provided a summary of the Navy's private well sampling activities. Tetra Tech., a Navy contractor, has assumed sampling responsibilities previously conducted by EPA. Slides were discussed comparing the private drinking water wells from February 2017 to the ones showing the current wells that have been most recently sampled. One well above the EPA Lifetime Health Advisory Level (HAL) have been identified since the last RAB meeting. Resampling of private wells below health standards in the sampling area is also occurring to get updated information and ensure protectiveness. Mr. Lin explained that for a brief period the laboratory analyzing the PFAS samples had a lapse in accreditation by the PADEP. As a result, a new laboratory was contracted, and the residences that were sampled during that period are not being resampled. The new laboratory will also be using an updated method for analyzing the PFAS compounds.

Brian Helland began to discuss the Remedial Investigation (RI) for PFAS. A draft report was submitted in November 2016 summarizing the data collected and identifying data gaps and strategies to collect additional needed data. Additional data was collected and presented in the draft Phase I Remedial Investigation report, which was submitted to the regulators in December 2018. Comments were provided by the regulators in April and May of 2019. The final report was issued in October 2019 and identified several data gaps.

As part of the Phase I RI, a stormwater and stream sampling investigations were conducted. The outfalls were sampled with results showing concentrations are lower during storm events. A contract has also been awarded to rebuild sections of the storm sewer to prevent contaminated groundwater from leaving the base.

Tricia Moore discussed the Phase II PFAS investigation that is now in preparation. The first round of sampling of surface water and sediment sampling was performed in July 2019. The second round of sampling was performed in October 2019. Surface water samples are being validated. The sampling was performed in conjunction with the USGS, and that the local water purveyors were invited to participate. The Navy will continue quarterly sampling for two additional sampling events. The Navy is funding the USGS to install additional stream gauges to assess mass loading.

Ms. Moore discussed the upcoming pilot test for groundwater treatment in the aircraft maintenance facility area around Hangar 680, where the highest PFAS levels were identified. The final work plan, as well as construction of the system, have been completed. Approval to discharge has been received. Full-time operations of the pilot test are scheduled to begin once it is verified that the samples collected are meeting the discharge limits. Once startup testing begins, routine sampling should occur almost daily at the beginning and then move to biweekly as the project continues. The system will be operated for a six-month period.

Ms. Moore discussed the Site 5 pilot test for PFAS. The wells will be located away from the bioremediation system. Lessons learned from the Hangar 680 pilot test will be applied. The work plan is anticipated to be completed in January 2020.

Ms. Moore reviewed additional plans that are currently in development. An offsite draft Sampling and Analysis Plan (SAP) has been prepared that details the installation of additional monitoring points outside of the base. This plan was submitted in July 2019, and comments have been received

and reviewed. An additional SAP for investigations of groundwater and soil for the base is expected to be completed in early 2020.

Mr. Lin finished by giving a short recap of the current progress that had just been discussed including the proposed dates for the next three RAB meetings.

Mr. Lin introduced Keith Freihofer to commence with the ANG presentation.

Mr. Freihofer gave a brief update on changes that have occurred since the last RAB meeting. The PFAS RI contract was rewarded in September 2019 to Leidos. The Phase 2 system to treat surface water is continuing to operate, and the Phase 3 system is in the procurement stage. The ANG has received the final NPDES industrial stormwater permit from PADEP.

Mr. Freihofer began the discussion on PFAS at the facility. A preliminary assessment conducted in 2015 identified ten potential PFAS source areas. These include areas where PFAS may have been used or stored, such as hangars, or where firefighting foam may have flowed to, such as the storm basin and wastewater treatment plant.

Mr. Freihofer introduced Matt Vest from Leidos to discuss the upcoming RI that they had been contracted to perform. Mr. Vest explained that the RI would be conducted to determine the nature and extent of the contamination as well as the potential threat to human health and the environment. Leidos will be collecting soil, sediment, surface water, and groundwater on the Horsham Air Guard Station and offsite. A Baseline Risk Assessment will also be completed. There will be four quarters of groundwater sampling, twelve quarters of surface water sampling, and an annual stream gauging event. Mr. Vest turned the presentation back over to Mr. Freihofer.

Mr. Freihofer explained that a treatment system has been installed at the storm basin outfall. The current system treats 60 to 100 gallons per minute. An improved system is in design now with the target of treating 250 gallons per minute. Improvements were made to the stormwater basin to retain precipitation runoff to allow more time to process at the treatment system.

Mr. Freihofer discussed perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) in drinking water. There was an agreement with Warrington Township to install carbon filtration on five of their supply wells and extend water mains for connections. Warrington Township has sold its water system to the North Wales Water Authority. The ANG is currently working with North Wales to transfer the agreement and continue the installation. Private well locations with detections above 70 parts per trillion (ppt) are being connected to the public supply. Mr. Freihofer presented a slide showing the number of private wells sampled with the number above the 70 ppt health advisory level and the number of connections completed.

Mr. Freihofer presented the actions that are planned for the following three months from the RAB meeting. The contract to conduct a remedial investigation has been awarded, and work on the RI should begin. The Phase 3 system is expected to be in construction, and the quarterly sampling of private wells will continue.

Lisa Senior commenced the USGS's discussion. Ms. Senior gave a brief history of the development of the USGS groundwater model. The groundwater model is being used to help

synthesize the data that is being collected at the base and help to identify data gaps as well as potential monitoring locations. It is anticipated that the model with help to make decisions on how to manage pumping in response to the PFAS contamination. Slides displaying the boundaries of the model, groundwater transport, and the geology of the area were shown to all those in attendance.

Ms. Senior continued by explaining the different methods for which groundwater can move through an area. Diagrams showing permeable and less permeable layers, the effect of dip on the layers, and fractures in the bedrock were explained to the audience. A brief flowchart describing how the models the USGS prepares was displayed before.

Ms. Senior gave an overview of how groundwater in the Willow Grove and Warminster areas is affected by multiple factors. Over the last few decades, there has been a dramatic decrease in the pumping of water from fractured rock in the area. The discharges are large compared to the recharge into the system which has a strong effect on the migration of the water as well as any that the water is carrying with it. A conceptual model of how groundwater moves was shown to all those in attendance.

Dan Good continued with an update on the USGS models of Willow Grove. Slides portraying the different model layers were shown to those in attendance. Mr. Good explained that each of the different layers has its own permeability, recharge rate, and transportation path. The extent of the model was explained followed by examples of data that has been collected. Over 1,000 ground water level readings as well as continuous stream gauge readings were used to help calibrate the model and estimate flow rates. The geology of the area was then discussed to show the effects that the different formations have on the spread of groundwater.

Mr. Good showed slides to the audience explaining the different simulations at the Willow Grove between 1999 and 2017 using the model they have produced. The differences between the two demonstrated years included pumping rates of wells and the resulting recharge time and discharge distance of the groundwater.

Ms. Senior concluded the USGS section of the presentation with the next steps the USGS will be taking and an overview of the model's uses. It was stressed that the model only produced simulations through groundwater and does not involve air or surface water. The model can be used to see the effect of groundwater pumping in the area, provide condition boundaries, and help to determine future actions at the base. The modeling has been completed, and most of the data will be made available to the public except for private well data to protect homeowner privacy. A report has been approved using the model, and it will detail what is occurring with the groundwater flow paths. This report will be issued to the public shortly, but an exact time has not yet been decided.

Sarah Kloss commenced EPA's discussion. Ms. Kloss provided a short explanation of the Superfund process and the roles each government agency plays. The EPA is responsible for oversight of both the Navy and the ANG. The EPA is tasked with reviews of the data that has been collected and providing input on what needs to be investigated further. The primary role is to oversee the cleanup and make sure that the Navy and ANG are protecting human health and the environment.

Ms. Kloss continued the presentation by explaining how the USGS model ties into the Superfund cleanup. The USGS model provides a line of evidence to help understand the contaminant boundaries on a regional scale. The model also supports the need to continue stream monitoring to ensure that conditions in the area are not changing. Ms. Kloss clarified that as stated earlier there are limitations to the model. The model does not include all the localized pathways and cannot predict specific concentrations of contaminants.

The EPA presentation concluded with Ms. Kloss detailing the short-term actions that are currently being taken for the protection of human health and the environment. The ANG will be working to increase the capacity of the storm basin at the base. The Navy will also install more monitoring wells offsite to ensure that conditions are stable. A second pilot test extraction and treatment will occur in the fire training area.

Mr. Lin opened the floor to questions from those in attendance.

Joe McGrath inquired about the cost to dispose of the soil that was recently excavated from the Willow Grove base. Mr. Lin responded that unfortunately the report with those costs has not been completed. Once the report has been finished, the costs will be made available.

Tom Ames asked about the possible short-term actions the EPA will be taking on the Air Guard side of Willow Grove. Ms. Kloss explained that the pilot test area that the Navy is working on is co-located with the areas of highest concentration on the ANG site as well. Deborah Goldblum added that as data is being collected during the RI, it will help inform the decisions that will be made on the ANG site.

Dave Fenimore requested more information about the process in which the USGS model was approved. Mr. Goode answered that the process of review goes through a fundamental science practice. This consists of peer reviews, internal reviews, and approval from supervisors in the USGS. There is also interaction with ANG as well as the EPA during the process in which the model was being designed. Ms. Senior added that an independent person also runs the model and checks to make sure that the results are correct and can be reproduced.

Greg Nesbitt expressed his desire to see additional slides in following meetings that provided concise conclusions that have been revealed by the published reports. Mr. Nesbit followed up by inquiring about the NPDES permit for the stormwater basin. Mr. Freihofer replied that the permit goes into effect on January 1, 2020. The goal is for the Phase 3 system that will be put in place to reach a discharge limit of 70 ppt or below. Currently, there is a funds transfer issue; however, after that has been resolved construction will begin on the system.

Mr. Nesbit also inquired about the fluctuation in the recent surface water results along Keith Valley Road. Ms. Moore answered that the samples can be collected during baseflow or during storm conditions. When a rain event happens prior to the samples being collected, the concentration levels will fluctuate since rainwater dilutes the surface water. The results were different due to the conditions in which they were collected. Mr. Helland added that the samples were collected after a storm event to see what the effect would be and that it was a one-time occurrence.

Mr. Nesbit requested additional information regarding the plan to fix the pipes in the underground stormwater system. Mr. Lin explained that the repair work would most likely start in the spring of 2020. Once work has begun, updates will be given during the following RAB meeting.

Kathleen Joyce inquired about the timeline for addressing groundwater contamination within the ANG area. Mr. Freihofer responded that they are awaiting the Navy's results from the pilot test study to use that data to better plan for extracting and treating the groundwater. Mr. Freihofer further explained that there is a six-month timeframe for the study, and the data collected will be shared with the ANG.

Bill Gallagher asked about the actions that will be taken once the feasibility study is concluded. Mr. Freihofer replied that as an emerging contaminant PFAS the remediation technology might not be the same once the study has been completed. As of now, pump and treat options are being used.

Ms. Kloss also added that based upon the results of the pilot test, a more scaled-up version may be a part of the short-term actions that were discussed earlier in the RAB meeting.

Todd Stephens requested the results from the most recent surface water monitoring event. Ms. Moore answered that since the samples were collected October and still need to be validated. Mr. Lin also explained that once the results become available, they will be posted to the Navy website listed in the handout.

Todd Stephens requested clarification on the details of the NPDES permit. Mr. Freihofer responded that the permit that was just issued is for the stormwater discharge that leaves the base from the entire facility. Prior to this, there was only a permit for water leaving the treatment plant. Mr. Freihofer added that that the average concentration over a month must be below 70 ppt, which is the same as the drinking water HAL.

Todd Stephens asked about the plans the Department of Defense has for the USGS groundwater model. Mr. Lin replied that he could not answer for the Department of Dense, but the primary importance to the Navy and ANG is to remove drinking water exposures above the lifetime health advisory. It is being used to help focus ideas to inform the remediation efforts.

Charles Hertz inquired about the possibility of the USGS or another government agency looking into surface water transport. Ms. Kloss responded that the EPA is looking into how the concentration of PFAS could be changing in the streams. As part of the RI, it is possible that the EPA will look further into how the water is getting into the streams. Ms. Senior additionally stated that there is currently no scope of work to do additional surface water modeling for the USGS; however, the USGS will provide support for measuring streamflow.

There were no other questions and Mr. Lin adjourned the RAB meeting. After a short break, Lora Werner of the ATSDR led a health discussion with community members.

NASJRB Willow Grove

Restoration Advisory Board (RAB)

4 December 2019

Overall Classification: UNCLASSIFIED

Agenda

- Welcome
- RAB background
- Environmental Restoration Status
- Per- and Polyfluoroalkyl Substances (PFAS)
- Future RAB meeting schedule

RAB Meeting Background

- 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.
- Health related issues are not addressed by the RAB. Health agency professionals will be available after the Navy and Air National Guard Environmental Restoration presentations.

Source: DoD RAB Rule Handbook

Environmental Restoration Status

Site 3 and Site 12 Landfills

- Two former landfills, Remedial Investigations showed:
  - Elevated levels of metals and PAHs in surface and subsurface soils.
  - Site 3 groundwater has low levels of PCE.
- Proposed Remedial Action Plans (PRAPs) under review by EPA and PADEP.
  - 11 November 2019 - Draft-Final Site 3 and 12 PRAP submitted to EPA/PADEP for review.
- PRAP Public Comment period
  - 15 December to 31 January 2020 – tentative planned 45 day public comment period.
  - Mid-January 2020 – public meeting, date/time to be scheduled.

Site 5 – Fire Training Area Groundwater

Site 5 Groundwater

Remedial Action

- **Anaerobic bioremediation system continues to operate successfully.**
- **Annual performance monitoring is being conducted in accordance with approved Operation, Maintenance, and Monitoring Plan.**
  - **May 2019 - Annual performance monitoring was performed.**
  - **October 2019 - Additional injections of amendments was completed.**
- **Results continue to show good conditions for biodegradation of volatile organic compounds (VOCs) and decreasing trends of VOCs.**

Per- and Polyfluoroalkyl Substances (PFAS)

Summary of Drinking Water Actions

- The Navy has provided funds to HWSA for filtration system costs and drinking water connections above the HA. The total funding is over $18 million. Additional funds were provided in 2019.
- The Navy has funded filtration systems at five Horsham Water and Sewer Authority (HWSA) public wells (#10, 17, 21, 26, and 40) which were found to be above the HA. All are back to drinking water service.

Private well sampling	Feb 2017	Current
Private wells sampled for PFOA/PFOS *	490	512
Private wells above lifetime HA (>70 ppt)	89	101
Private wells not yet connected	27	7 **
Private wells below HA/monitored (>40 ppt)	70	59

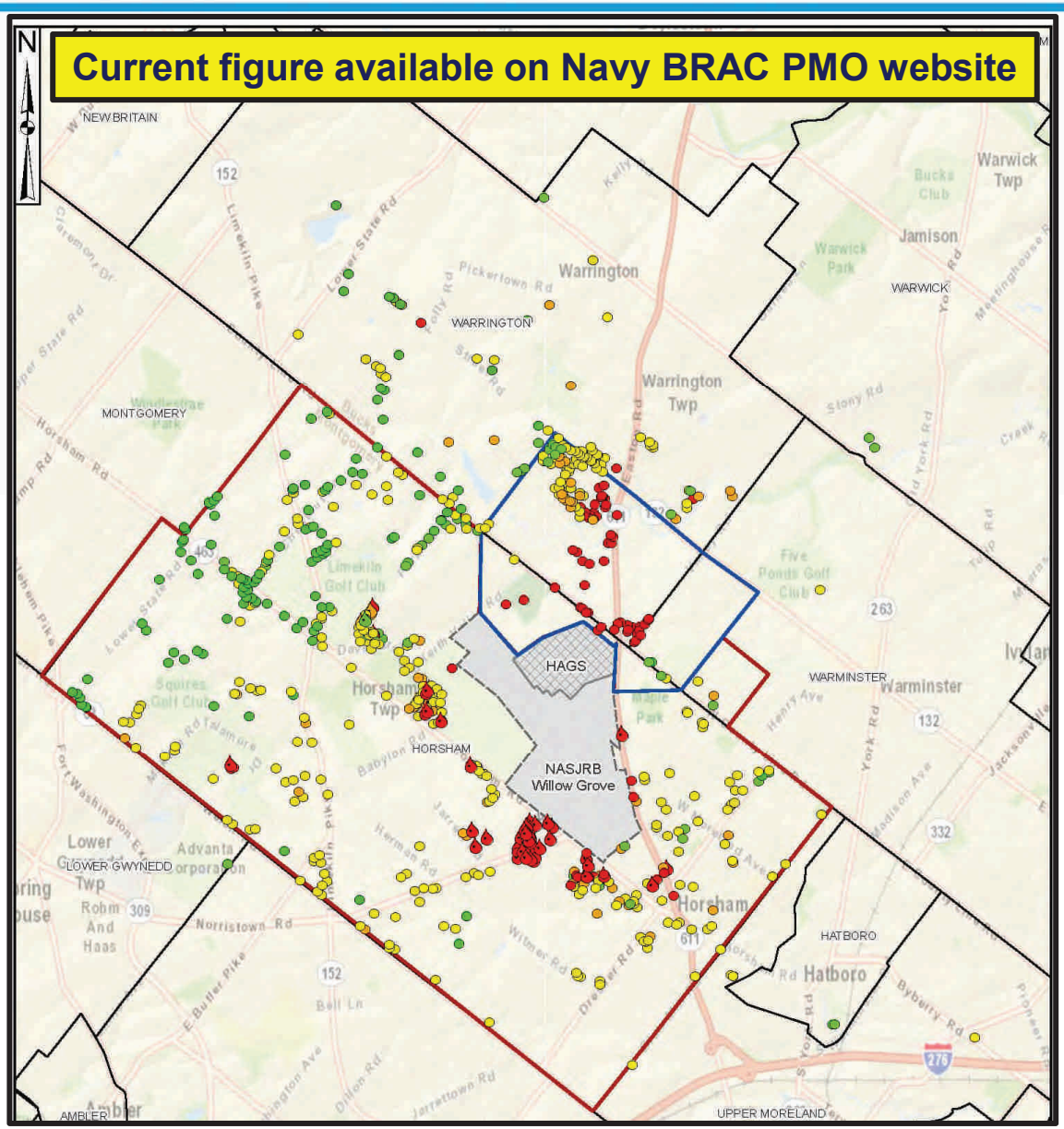
* Includes 47 wells sampled in Warrington, now managed by Air National Guard

** Of these, two (2) are currently being scheduled

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:
Tricia Moore
Tetra Tech Project Manager
tricia.moore@tetratech.com
Phone: (610) 382-1171



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Private Drinking Water Well Sampling

- **The Navy is re-sampling most private drinking water wells, within the sampling area, that are not being regularly monitored.**
  - **Obtains updated information and to ensure protectiveness.**
  - **The wells closest to NASJRB Willow Grove were sampled first.**
  - **Tetra Tech is contacting property owners to schedule sampling.**
  - **<u>Re-sampling expected to complete in early 2020</u>.**

Private Drinking Water Well Sampling

Laboratory Accreditation

PFAS Laboratory accreditation

- The Navy uses laboratories that are both accredited by the Department of Defense and Pennsylvania Department of Environmental Protection (PADEP) for EPA method 537, for drinking water.
- In September 2019, the laboratory was suspended by PADEP for method 537. Preliminary results from sampling from September 2019 through October 2019 did not show exceedances of the PFOA and PFOS LHA levels of 70 ppt.
- The Navy selected different laboratories, properly accredited with the new EPA method 537.1, in November 2019. The Navy will use EPA method 537.1 for all future sampling. The Navy is re-sampling private drinking water wells impacted by the suspended accreditation. A letter is being provided to impacted property owners.

For more information:

https://www.epa.gov/pfas/epa-drinking-water-laboratory-method-537-qa

https://www.denix.osd.mil/edqw/accreditation/home/

https://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

Phase I PFAS Investigation

- **The Navy is performing a Remedial Investigation (RI) to better understand the nature and extent of the PFAS contamination, and facilitate evaluation of potential remedies.**
- **<u>October 2019 - Final Phase I RI Report completed</u>. Available at Horsham Library information repository.**
- **A number of data gaps were identified that will be addressed in Phase II.**

Horsham Township Library Information Repository
http://oldhtl.mclinc.org/WillowGroveNASindex.html

Phase II PFAS Investigation

- Scoping Sessions with PADEP and EPA held in December 2018 and January 2019.
- PFAS Phase II investigation includes, but is not limited to:
  - Evaluation of groundwater extraction and treatment systems using pilot test information.
  - Periodic surface water monitoring.
  - Additional monitoring wells and soil sampling in source areas.
  - Further evaluation of on-base storm water systems.
  - Off-base monitoring wells.
  - U.S. Geological Survey (USGS) groundwater migration information

Phase II PFAS Investigation

Surface Water Sampling

- The Navy has prepared a sampling and analysis plan (SAP) for monitoring off-site surface waters and sediment that may be impacted by PFAS from former NASJRB Willow Grove.
- July 2019 validated results will be posted to BRAC PMO website. Results are similar to previous sampling results.
- October 2019 - Second round of surface water monitoring was performed, with support from the USGS. Drinking water purveyors were invited to participate. Sampling results are currently being validated.
- Navy is funding USGS to install additional stream gages to assess mass loading.
- The Navy will sample quarterly for a year and will coordinate future surface sampling with the Air National Guard.

Phase II PFAS Investigation
Groundwater Treatment Pilot Tests

- **Pilot Test at former Aircraft Maintenance Hangar 680**
  - **Final Work Plan was submitted March 20, 2019**
  - **Pilot test progress:**
    - September 3, 2019 - PADEP discharge approval.
    - September 6, 2019 - Construction completed.
    - September 10, 2019 - Startup testing initiated. Treated water is being stored until confirmation that discharge limits are met.
    - Issues with phenol detections have delayed full operation
    - System improvements were installed late-November. Awaiting laboratory analyses to confirm phenol removal.
    - Full-time operations expected to commence mid-December.
    - System will operate for an initial 6-month period.
  - **The pilot test provides groundwater and treatment information for design of a full-scale system.**

Phase II PFAS Investigation

Groundwater Treatment Pilot Tests

- **Pilot Test at former Fire Training Area (Site 5)**
  - **The former fire training area (Site 5) has elevated levels of PFOA and PFOS in the groundwater, and is a likely source area due to historical activities.**
  - **An in-situ bio-stimulation remedy is operating successfully to reduce VOCs.**
    - PFAS treatment cannot interfere with that remedy.
    - Extraction wells will likely be between the VOC plume and the base boundary.
  - **<u>The draft work plan is now planned for January 2020</u>, using lessons learned from the Hangar 680 pilot test.**

Phase II PFAS Investigation

Other plans

- **Other plans in development:**
  - **Draft Sampling and Analysis Plan (SAP) for off-site groundwater monitoring wells.**
    - Draft prepared July 2019.
    - Comments received and being reviewed.
    - HWSA has offered access to several observation wells.
    - Additional discussions planned to finalize well locations.
  - **Draft Sampling and Analysis Plan (SAP) for on-base groundwater wells and soil – expected in early 2020.**

Stormwater System Evaluation

- The NASJRB storm water system was evaluated to locate portions where PFAS impacted groundwater may infiltrate and discharge to local surface water. Over two miles of storm sewer lines reviewed, using remote video inspections in the fall of 2018.
- A technical memorandum identifying leaking storm sewer lines was completed in March 2019. A copy was provided to the Horsham Township Library.
- The Navy has awarded a contract to carry out the report recommendations. Work began in November 2019 with video inspection of additional sections.
- Repairs planned to commence by early Spring 2020.

Action Summary since previous RAB

- Actions completed
  - Completed second round of surface water monitoring.
  - Draft-final Site 3 and 12 PRAP provided to regulators.
  - Site 5 bio-stimulation amendments
  - Changed private drinking water well analysis to EPA Method 537.1
  - Hangar 680 pilot test system improvements
- Actions soon to be completed
  - Site 3 and 12 PRAP public comment period and meeting.
  - Draft work plan for Site 5 PFAS groundwater pilot test
  - Third round of surface water monitoring

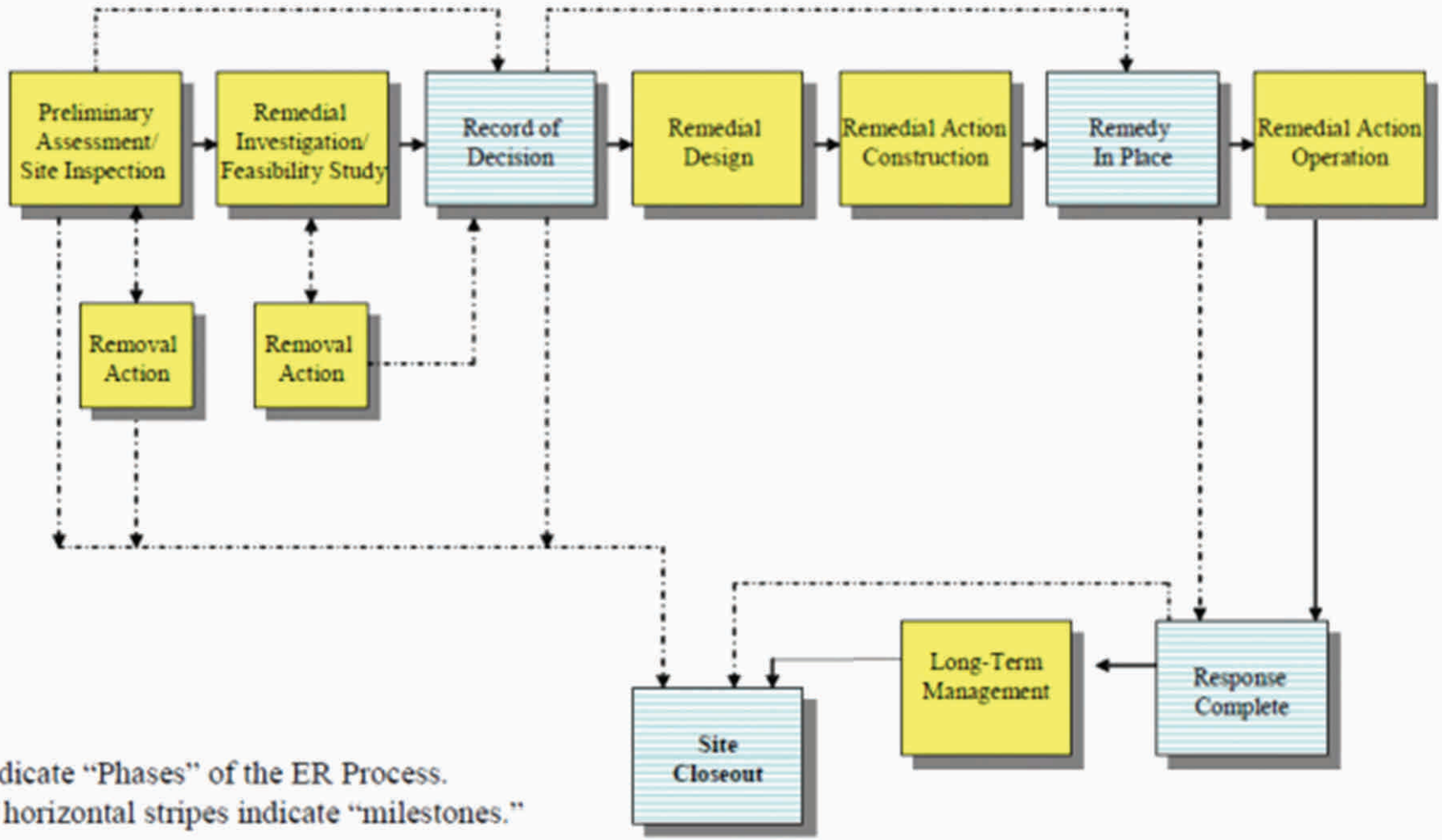
Next RAB Meetings

- Dates
  - Wednesday, March 18, 2020 at 6:00 pm.
  - Wednesday, May 20, 2020 at 6:00 pm.
  - Wednesday, September 16, 2020 at 6:00 pm.
- Location
  - Meetings scheduled at Horsham Library

RAB information available at the NASJRB Willow Grove website:
https://www.bracpmo.navy.mil/brac_bases/northeast/reserve_base_willow_grove.html

Back-up / Additional Information

Environmental Restoration Program



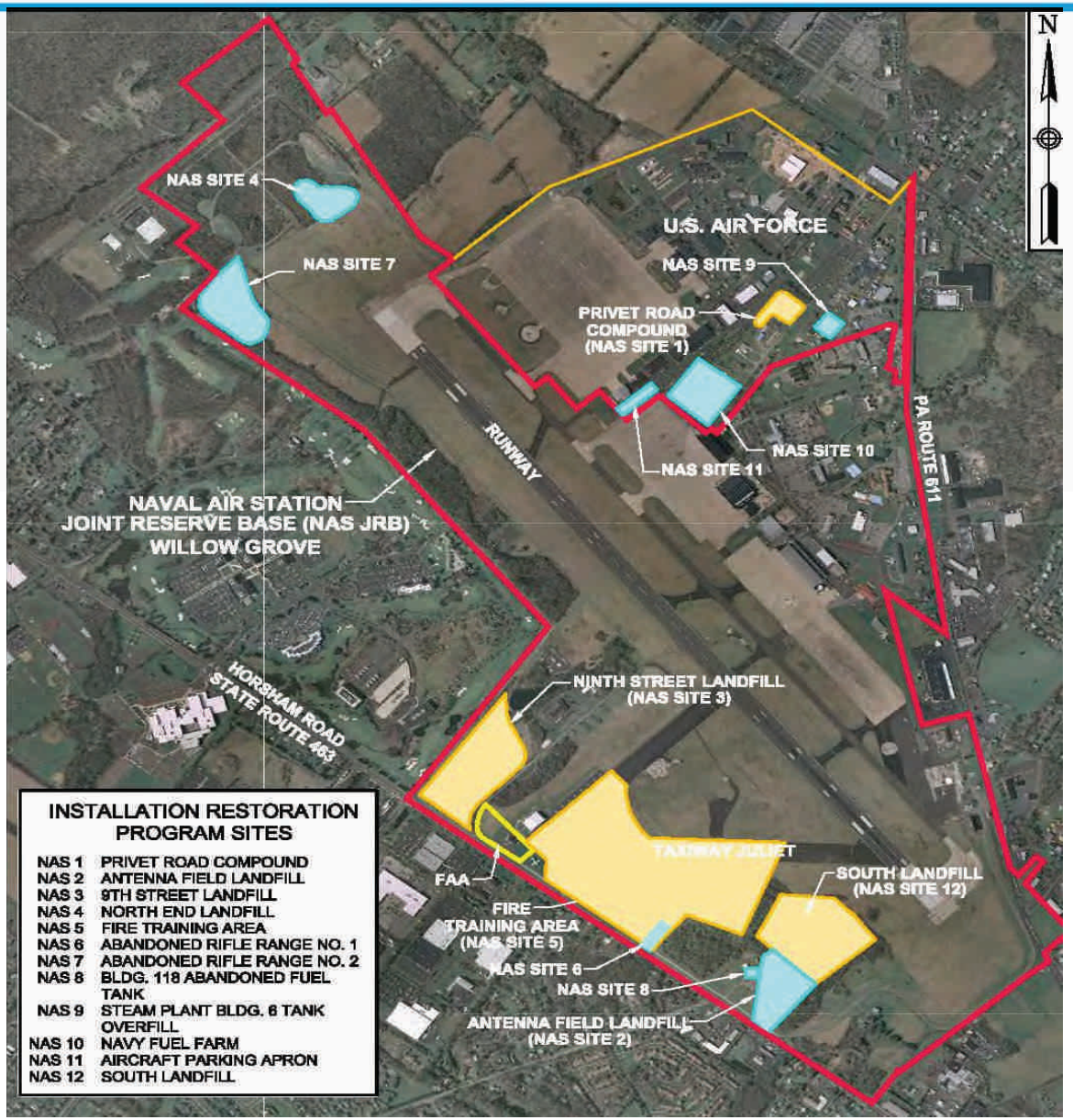
Notes:
Yellow boxes indicate "Phases" of the ER Process.
Boxes with blue horizontal stripes indicate "milestones."

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 Oct. 2011/FS Pending
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 Sept. 2007 Groundwater (OU 2) ROD signed Sept. 2012 Groundwater (OU 2) RACR Signed Sept. 2014 Groundwater (OU 2) Final OPS and OM&M Plan May 2015
6	Abandoned Rifle Range No. 1	. . .	Consensus Agreement for No Action Dec. 2007
7	Abandoned Rifle Range No. 2	. . .	Consensus Agreement for No Action Aug. 2008
8	Building 118 Abandoned Fuel Tank	. . .	NFA Agreement Oct. 2006
SSA 11	Aircraft Parking Apron	. . .	Eliminated From Consideration
12	South Landfill	OU 11	Final RI Feb. 2014, FS to follow
PFCs/PFAS	Perflourinated Compounds/Per- and Polyfluoroalkyl substances	OU 12	TCRA Sept. 2015, Final PA/SI Mar. 2016, RI in progress.

NASJRB Willow Grove

Environmental Restoration Sites



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PFOA / PFOS Background

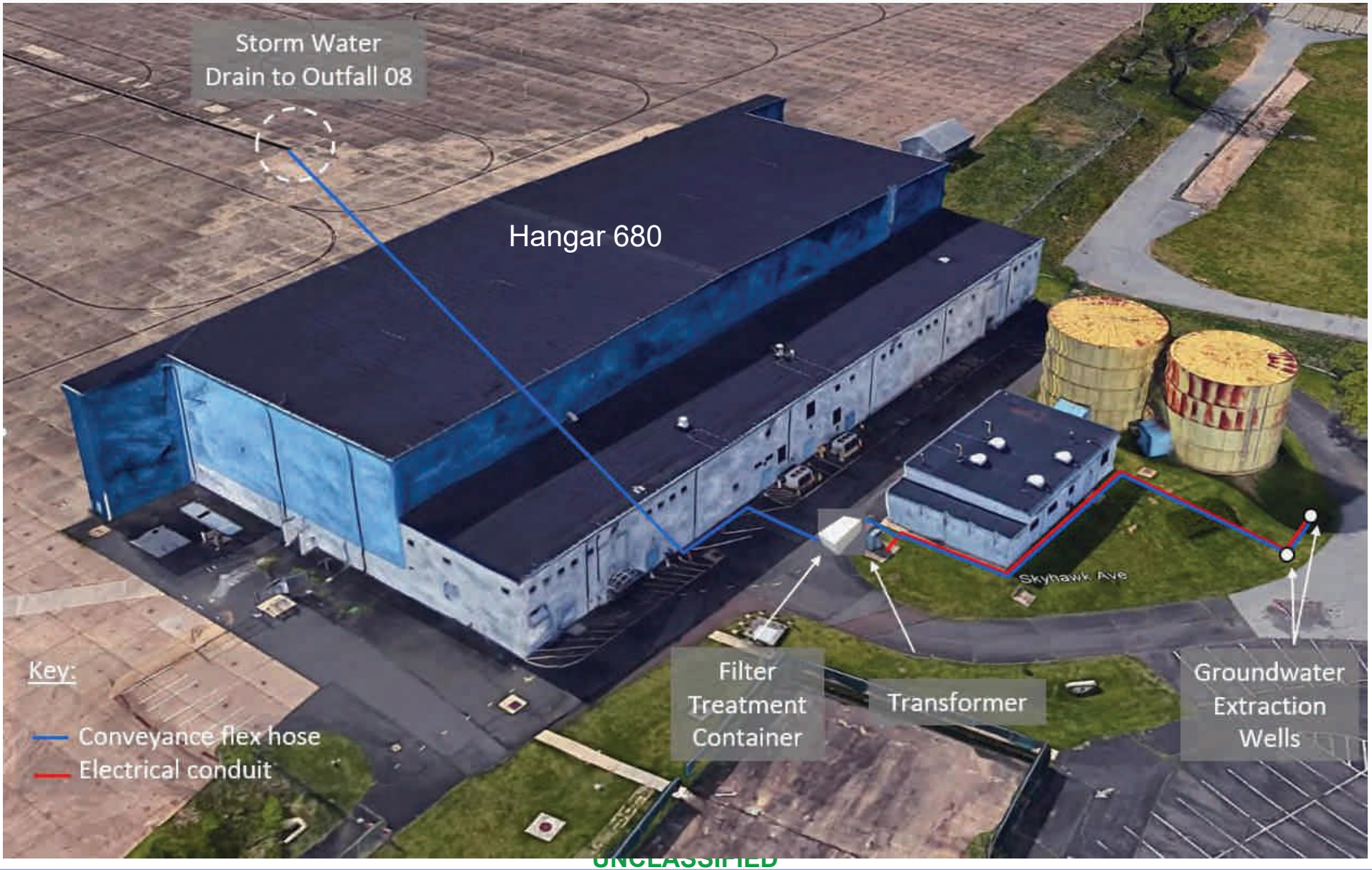
- In mid-2014, PFCs known as Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) were found in public drinking water wells near NASJRB Willow Grove through an EPA program known as the Unregulated Contaminant Monitoring Rule (UCMR).
- The health advisory levels at that time were 0.4 micrograms per liter (µg/L), or 400 parts-per trillion (ppt), for PFOA and 0.2 µg/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 parts-per-trillion (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.

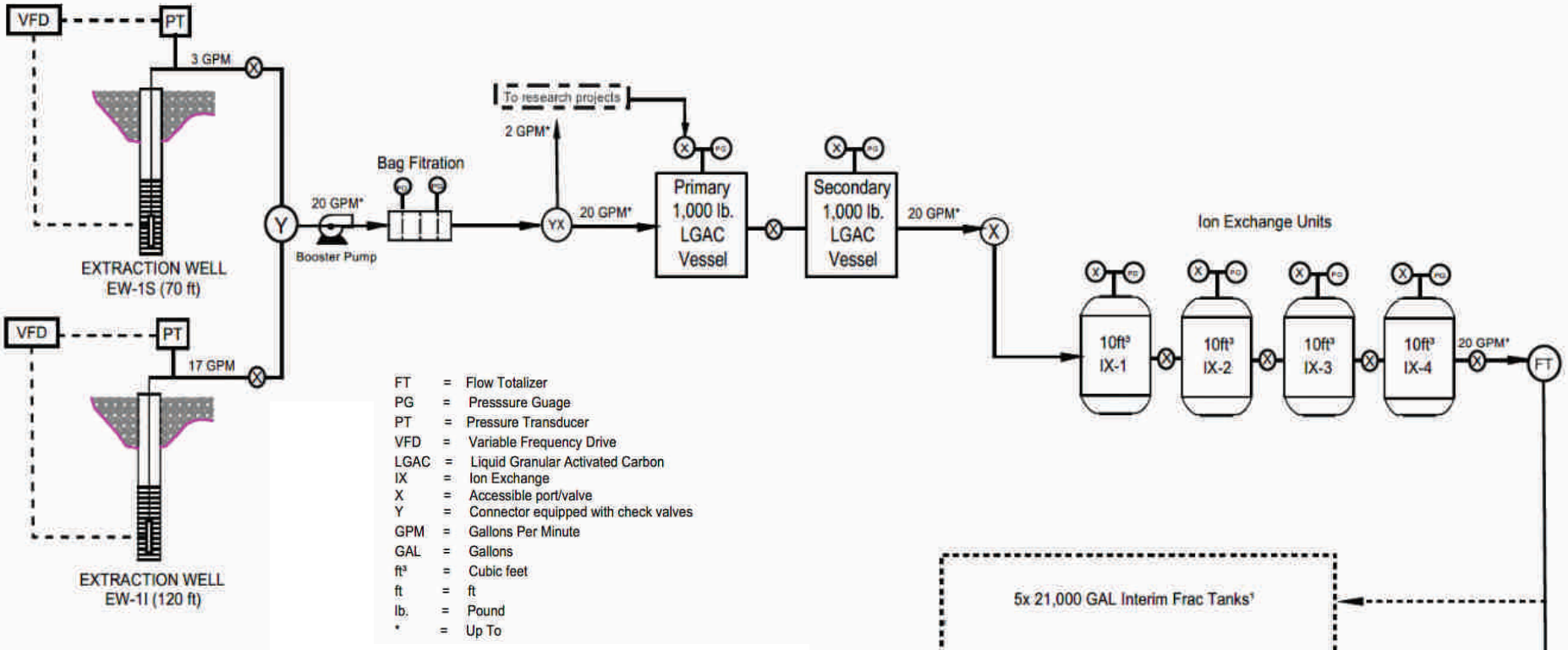
Pilot Test Treatment System

Pilot Test Layout



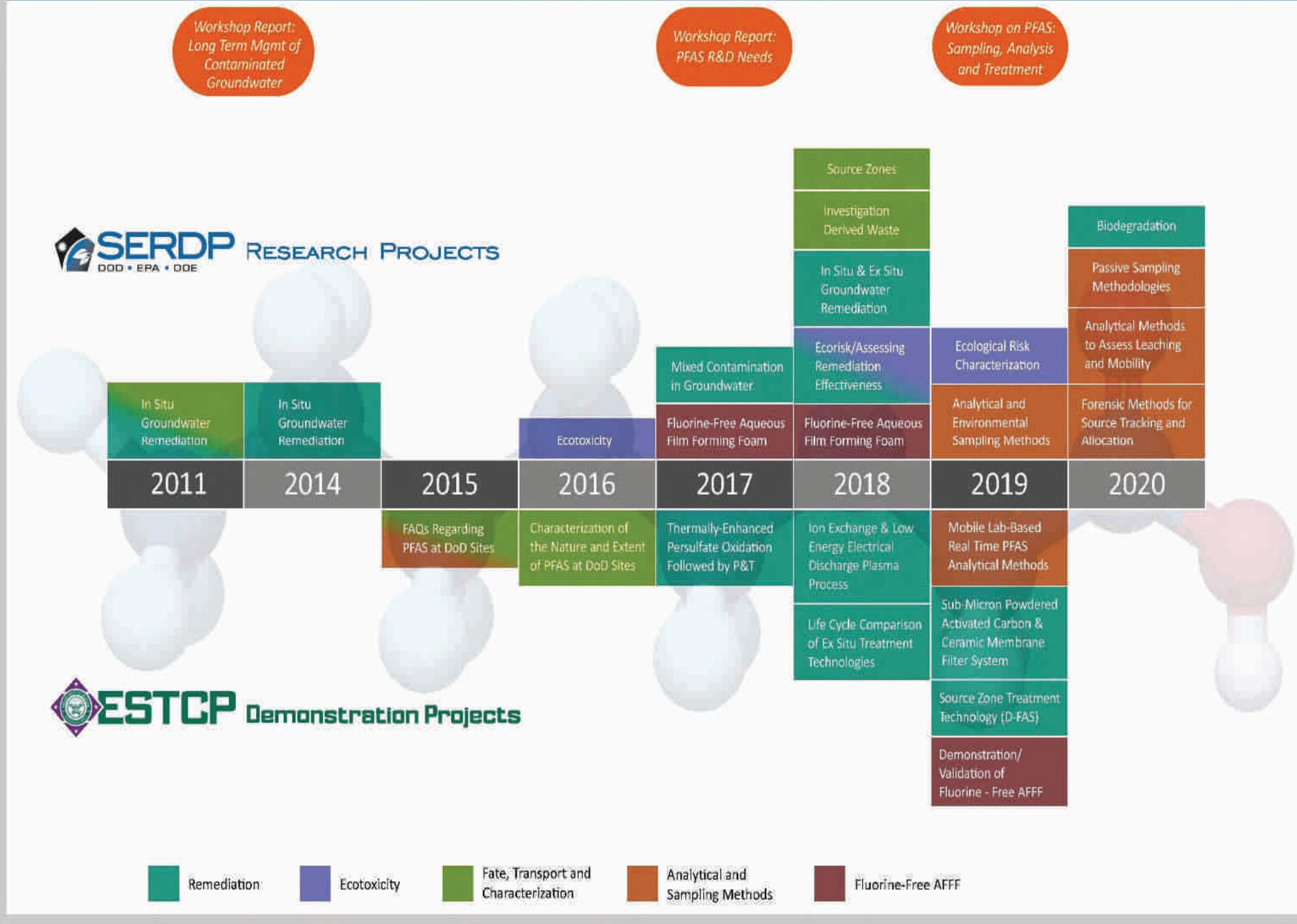
Pilot Test Treatment Process

Treatment Direction



Note:
Monitoring will be performed prior to discharge for parameters identified in the PADEP NPDES permit equivalency. Frac tanks will be utilized to hold the treated water while awaiting initial laboratory results to confirm discharge limits are met.

SERDP and ESTCP Efforts on PFAS



Participation in DoD Funded PFAS Research

- **SERDP/ESTCP are DoD-funded environmental research programs.**
- **NASJRB Willow Grove is supporting ~$8M 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**
  - 12 Total Projects Participated
  - Projects Since Last RAB
    - ER-1026 – Cornell University
    - ER-1497 – Univ. of CA Riverside
    - ER-1491 – Univ. of Illinois at Chicago
  - ER18-1300 –College of Wooster
    - Working with College on field column study on new adsorptive resin.
- **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:

http://serdp-estcp-pfas.com/pfas_efforts/pfas_efforts.pdf

PFAS Information and Resources

Department of the Navy (DON) Perfluorinated Compounds (PFC) / Perfluoroalkyl Substances (PFAS) website

http://www.secnav.navy.mil/eie/pages/pfc-pfas.aspx#

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

- **http://bracpmo.navy.mil/brac_bases/northeast/reserve_base_willow_grove/documents.html**
- **http://bracpmo.navy.mil/brac_bases/northeast/former_warfare_center_warminster/documents.html**

A subscription service is available on these 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://www.atsdr.cdc.gov/pfc/index.html

Pennsylvania Department of Environmental Protection
http://www.dep.pa.gov/Citizens/My-Water/drinking_water/Pages/default.aspx

Horsham Township
http://www.Horsham.org/default.aspx

Warminster Township
http://warminstertownship.org/information-on-perfluorinated-chemicals-pfoa-and-pfos/

PFAS Information and Resources
(continued)

Horsham Water and Sewer Authority

https://www.horshamwater-sewer.com

Warminster Township Municipal Authority

https://www.warminsterauthority.com/

Pennsylvania Department of Health

http://www.health.pa.gov/My%20Health/Environmental%20Health/Pages/default.aspx

Horsham Township Library Information Repository

http://oldhtl.mclinc.org/WillowGroveNASindex.html

Restoration Advisory Board
Horsham Air Guard Station

Keith Freihofer
NGB/A4VR
4 December 2019

Updates Since September

- Environmental Restoration Program Sites:
  - No change
- PFAS Remedial Investigation:
  - Contract awarded 30 September
- PFAS surface water treatment:
  - Phase II system continuing to operate
  - Phase III system and basin upgrades in procurement
  - Draft NPDES Industrial Stormwater permit under review

PFOS/PFOA on Horsham AGS

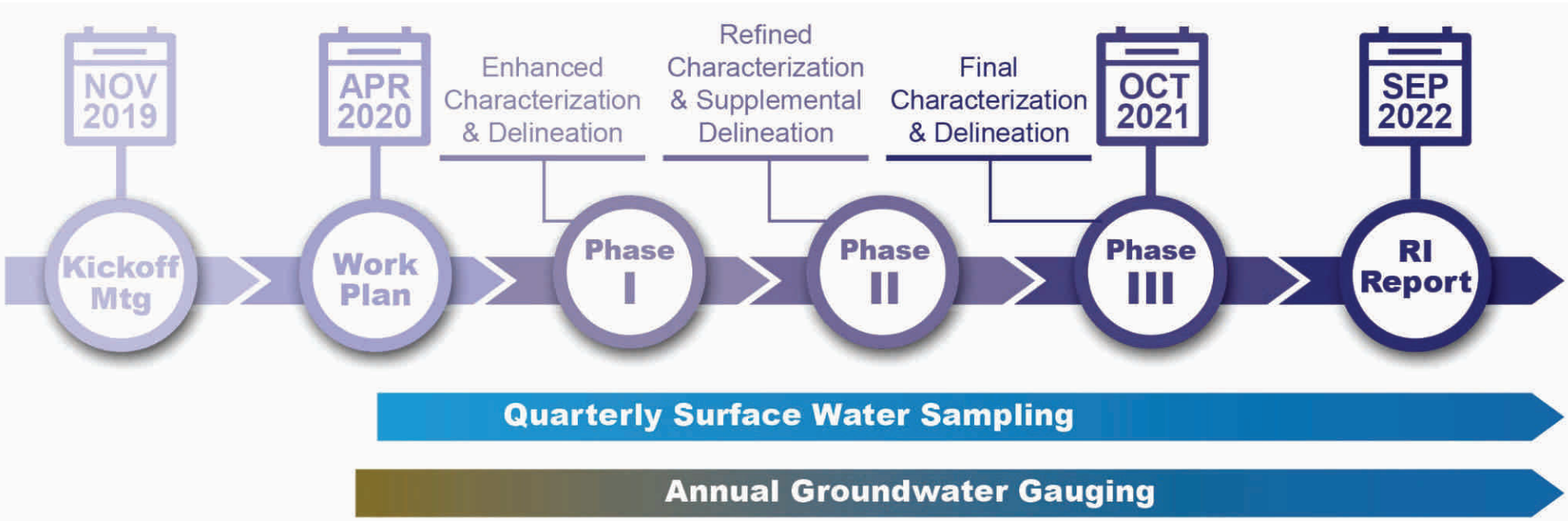
- In 2015, ANG completed a Preliminary Assessment of potential PFOS/PFOA release sites at the Horsham Air Guard Station (AGS). Ten potential source areas identified in the PA include:
  - Buildings that contained foam fire suppression systems
  - Areas that may have received runoff from foam releases
  - Stormwater sediment basin
  - Former waste water treatment plant
  - Former storage area for wastewater treatment sludge
- These potential source areas were further investigated by Leidos in a PFOS/PFOA Facility Investigation and additional investigation will occur in the Remedial Investigation (RI)

Potential PFOS/PFOA Source Areas

PFAS RI Project Objectives

- Delineate the nature and extent of PFAS contamination, the threat to human health and the environment and prepare a RI Report within 36 months.
  - Collect soil, sediment, surface water, and groundwater PFAS data on and around HAGS
  - Conduct Baseline Risk Assessment (BRA)
  - Investigate link between groundwater and unnamed tributary to Park Creek
  - Obtain data required to inform future development of a Feasibility Study
  - Conduct quarterly surface water sampling for PFAS (12 quarters)
  - Conduct annual potentiometric gauging to support USGS model

RI General Project Steps and Schedule



PFOS/PFOA in Surface Water on Horsham AGS

- PFOS/PFOA has been detected in surface water leaving the Horsham Air Guard Station. This water flows from a stormwater detention basin on the northwest boundary of the Base to Park Creek which flows to the Little Neshaminy Creek.
  - ANG is taking actions to reduce this release of PFOS/PFOA to the Creek:
    - An updated carbon filtration system was installed on the outfall in August 2018 replacing the original system from September 2017. The system is designed to reduce dry weather flow PFOS/PFOA concentrations to below 70 PPT. Treats 60-100 gallons per minute.
    - Improved system in design now with target of treating 250 gallons per minute. This will treat all dry weather flow with capacity to treat some wet weather flow. Improvements to the stormwater basin will retain some precipitation runoff to allow system time to treat it

PFOS/PFOA in Drinking Water

- Warrington Township recently sold its drinking water system to North Wales Water Authority (NWWA). ANG will negotiate with NWWA to transfer the $13.5 million Warrington Township cooperative agreement to them for installation of filtration on five municipal wells.

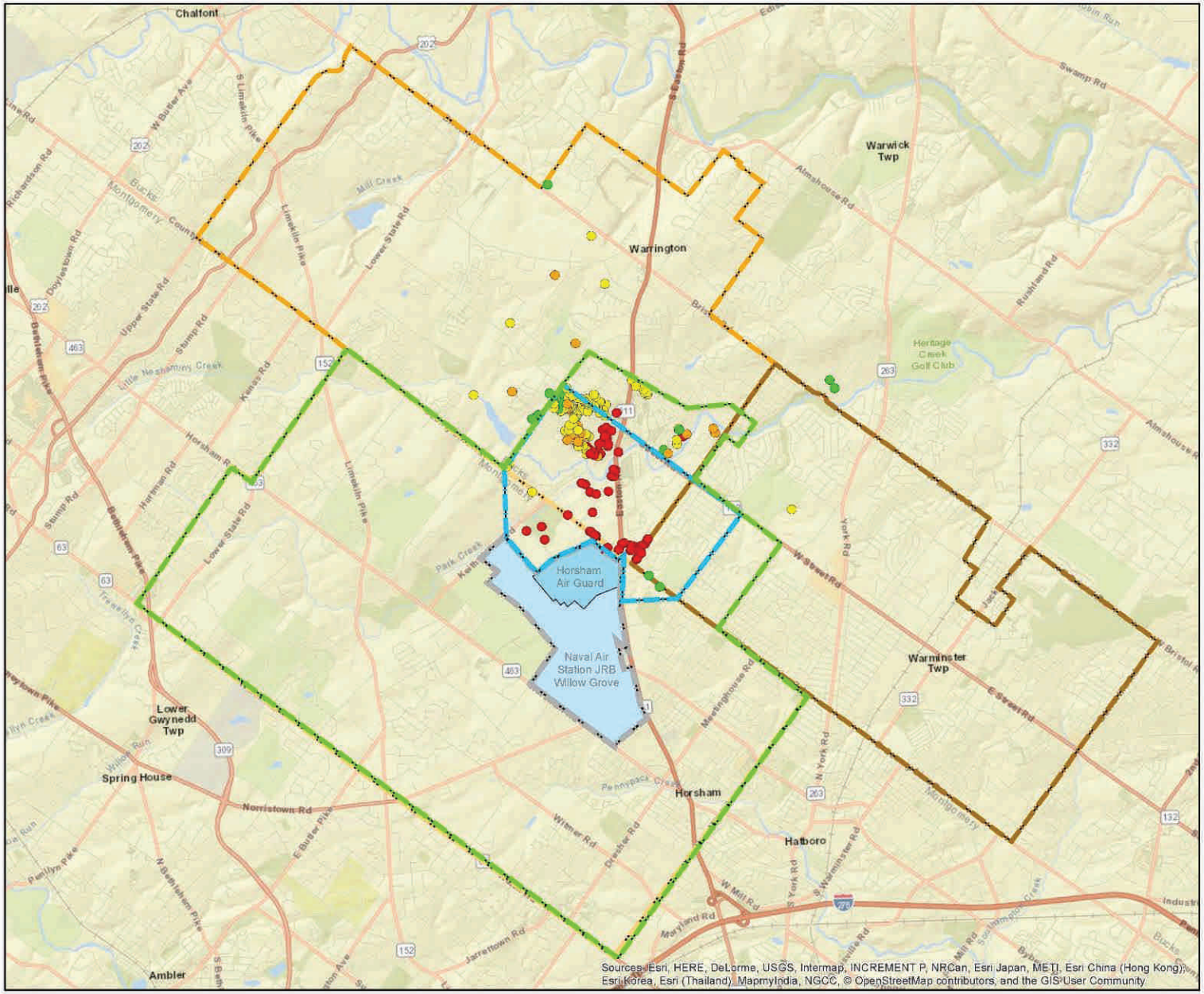
Private Well Sampling

- ANG has contract in place with Wood to provide PFOS/PFOA testing of private drinking water wells and supply bottled water to properties with PFOS/PFOA at or above the lifetime health advisory level (HAL) for residents within our area of responsibility in Horsham, Warminster, and Warrington
- The number of private wells sampled by ANG are:
  - Horsham: 5, all above HAL; 4 have been connected to municipal water (remaining one not in use)
  - Warrington: 150, 46 are above HAL; 35 have been connected
  - Warminster: 12*, 11 are above HAL; 8 have been connected

    *Some of these properties are on Valley Road with Warminster mailing addresses but are located in Warrington Township
- Sampling contact for ANG area of responsibility: David Side at david.side@woodplc.com or (610) 877-6111

UNCLASSIFIED

Private Well Sampling Map



PFC Sample Location Map
as of October 2018

Horsham Air Guard Station
Horsham and Warrington Township

Legend

Health Advisory Level (HAL)
HAL is the sum of both PFOA+PFOS
(PFOA 0.070 ug/L, PFOS 0.70 ug/L)

- Sum of PFOA+PFOS concentrations above 0.070 ug/L
- Sum of PFOA+PFOS concentrations detected between 0.040 ug/L and 0.070 ug/L
- Sum of PFOA+PFOS concentrations detected at or below 0.040 ug/L
- PFOA & PFOS not detected
- Horsham Air Guard
- Former NAS JRB Willow Grove
- Sampling Area
- Air Force Administrative Order Boundary
- Horsham Township
- Warrington Township
- Warminster Township

Notes & Sources

Sources:
Street Base Map hosted by ESRI.

0 1,950 3,900 7,800 11,700 15,600 Feet

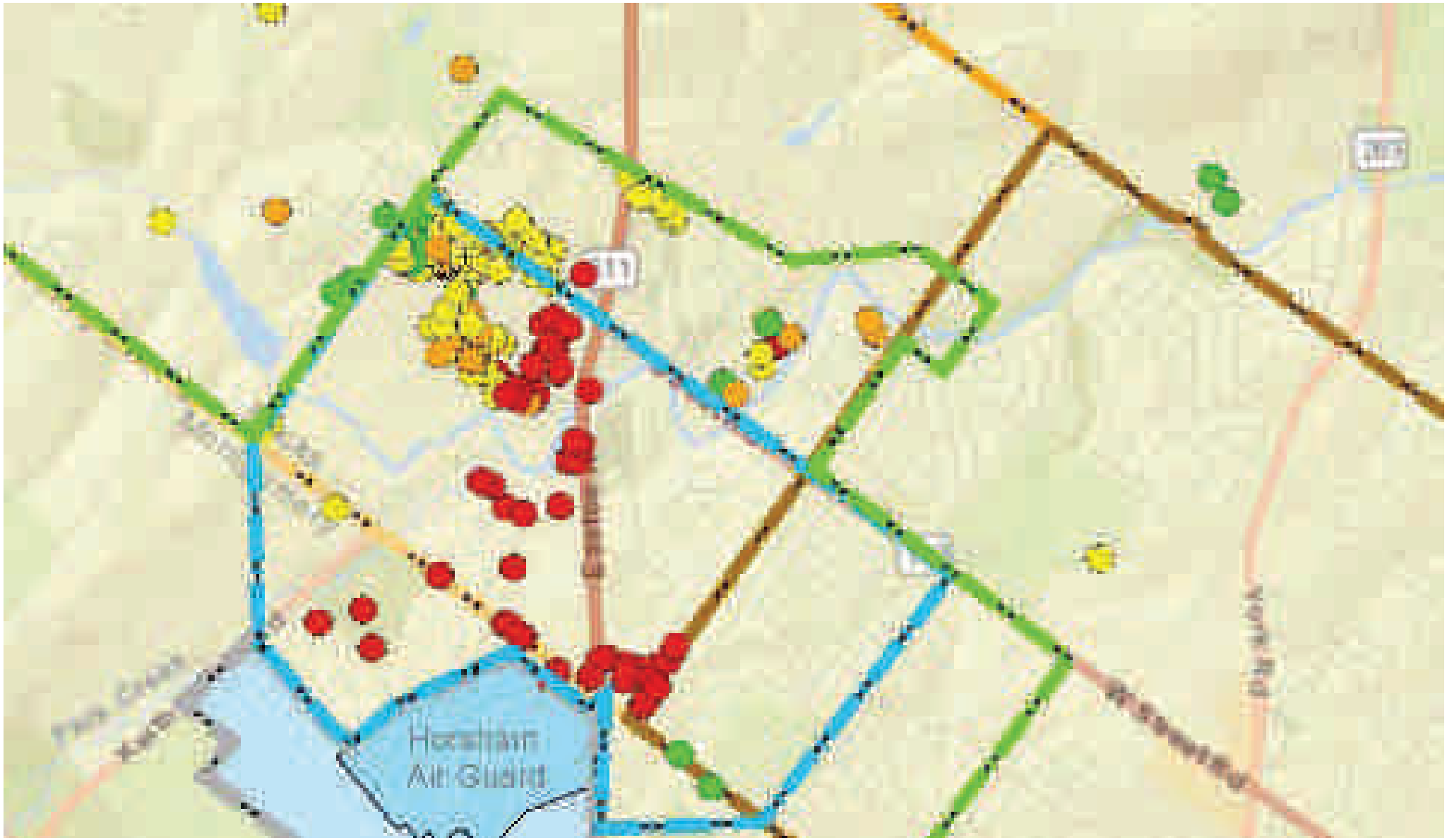
N

wood.
Wood
Environment & Infrastructure, Inc.
751 Arbor Way
Blue Bell, PA 19422
(610) 828-8100

Figure 2

UNCLASSIFIED

Private Well Sampling Map



Actions Planned for Next 3 Months

- PFAS Remedial Investigation:
  - Work plan development
- Surface water treatment:
  - Phase III system to be built
  - Draft NPDES Stormwater Permit is under review
- Continued private well sampling

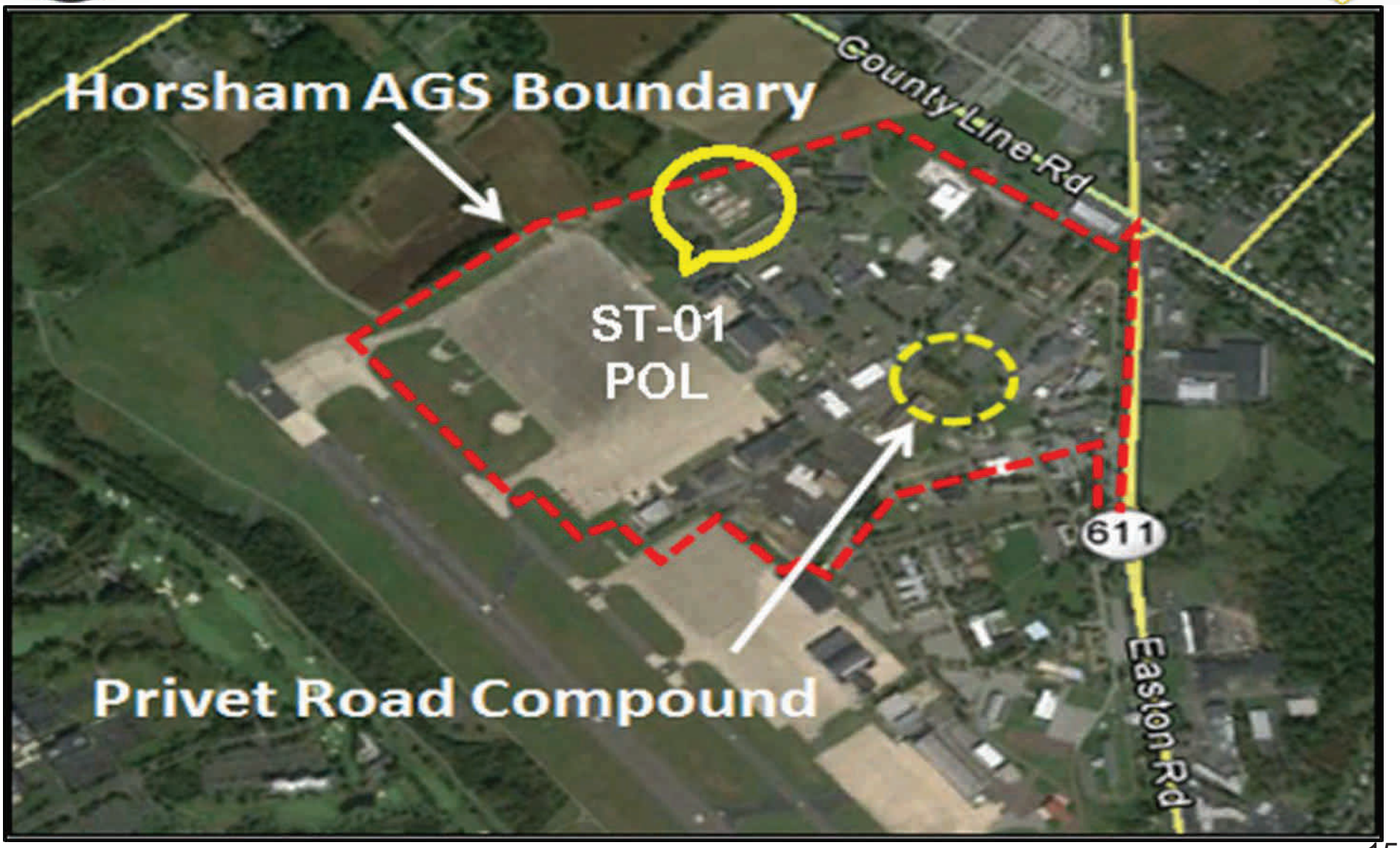
Questions?

Keith Freihofer
keith.e.freihofer.civ@mail.mil
240-612-8762

Air National Guard Administrative Record:
http://afcec.publicadmin-record.us.af.mil/Search.aspx
select “Air National Guard”, then “Horsham AGS”, then click Search

Previously Presented Data

Environmental Restoration Program Sites



Air Force Reserve ST-01 POL

- Former Air Force Reserve Petroleum Tank Area
  - Originated from a jet fuel spill in the 1970's
  - Injections of persulfate and Epsom salt replaced the biosparge system in 2016
  - Petroleum tanks were dismantled in 2016
    - Disposed 175 tons of petroleum impacted soil at licensed facility
    - Confirmatory sampling contract underway in accordance with 25 Pennsylvania Code, Section 245.310 of the Department of Environmental Protection (DEP)'s Rules and Regulations
- Results were provided and accepted by PADEP on 10 September 2019 in a Supplemental Remedial Investigation Report and a Site Characterization Report in accordance with:
  - Closure Requirements for Aboveground Storage Tank Systems Technical Guidance Number 263-4200-001 (PADEP, 2017)
  - Pennsylvania Code, Chapter 245-310 Site Characterization Report

- POC: Ms. Margaret Patterson: margaret.patterson@us.af.mil

Privet Road Compound

- Former waste management area for Naval Air Station Joint Reserve Base Willow Grove
- Sampling completed in 2017 indicates trichloroethene (TCE) and tetrachloroethene (PCE) exist in the groundwater but levels are below maximum contaminant levels (MCL) set by the U.S. Environmental Protection Agency for drinking water quality
- Leidos, Inc. is contracted for continued long-term monitoring. Biannual groundwater sampling and land use control inspections will continue to be conducted pending a final site remedy
- Second Five-Year Review for Privet Road groundwater contamination was finalized in September 2018 and is available on the ANG Admin Record

PFAS Investigation Update

- GW sampling event conducted in March 2018
- Joint gauging event conducted 8-9 March 2018
- Baseflow SW sampling conducted 19 March 2018
- Rain event SW sampling conducted 28-29 June 2018

- Documents available on Administrative Record
  - Final Facility Investigation Report
  - Final Groundwater Monitoring Reports for December 2017 Sampling Event
  - Final Groundwater Monitoring Reports for March 2018 Sampling Event
  - http://afcec.publicadmin-record.us.af.mil/Search.aspx
- Final Stormwater Study Tech Memo submitted March 2019
- Final Conceptual Design Report submitted to ANG
- NPDES stormwater permit application submitted to PADEP 28 August

Groundwater Data Update

- Gauging conducted 8-9 March 2018
  - Semi-confined multilayer aquifer system, subdivided into four zones for contouring
  - Gradients trends northwest in each zone
- Sampling event conducted 5-15 March, 2018
  - Concentrations similar to previous events
  - 78 of 85 locations exceeded 70 PPT (ng/l) (combined PFOA/PFOS)
  - Highest concentrations found in three general areas: along the southern boundary, near Building 335, and near Building 201.
  - Highest concentrations at PMW01, Zones A, B, and C: 329,500 PPT, 147,400 PPT, and 186,900 PPT, respectively.
  - Next highest concentration at IMW-06 (49,000 PPT) along the southern boundary).
  - Four wells near Buildings 201 and 335 contained concentrations above 10,000 PPT.

GW Results: March 2018

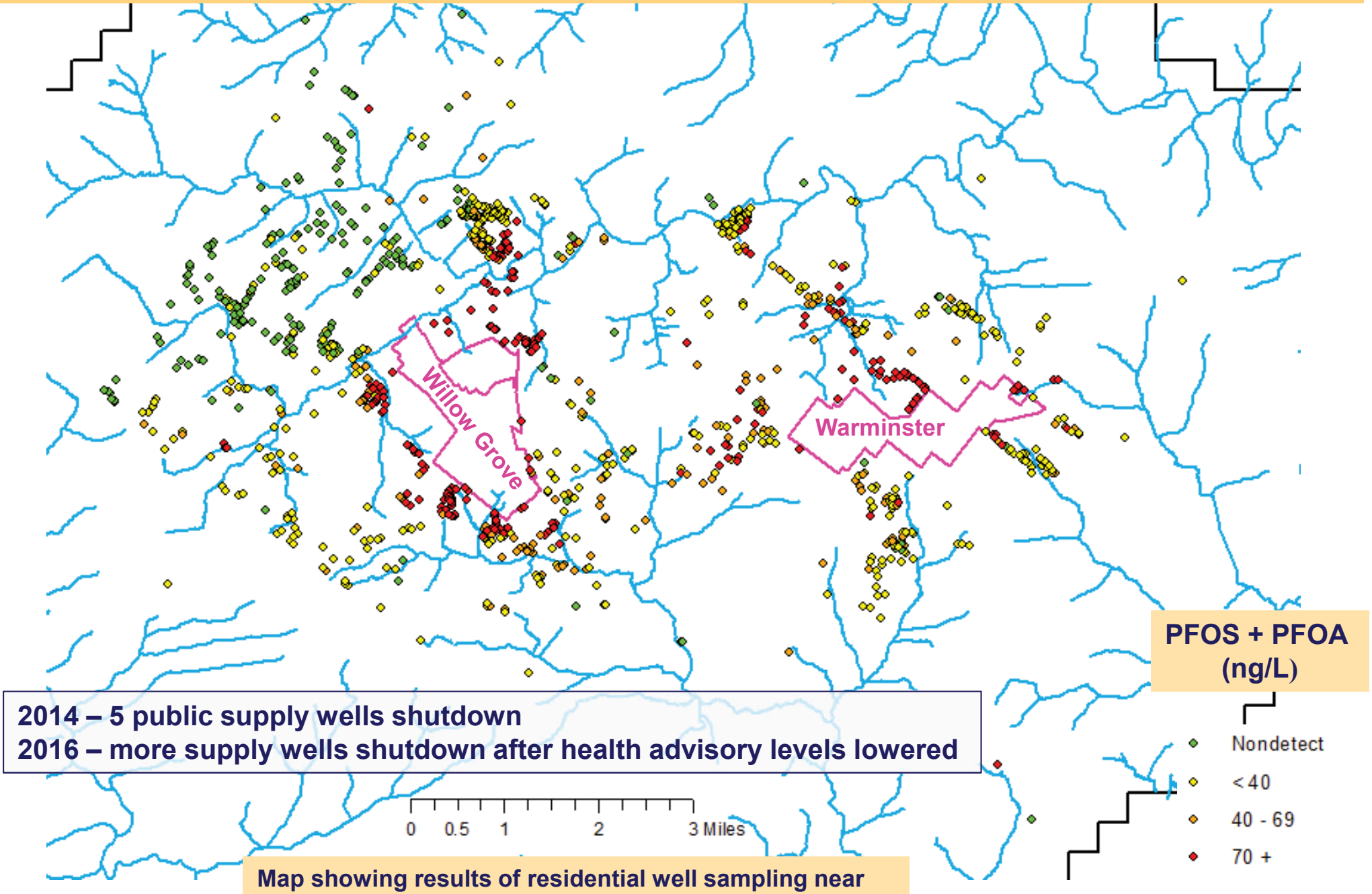
Preliminary Evaluation of Regional Groundwater-Flow Paths near Willow Grove NASJRB and NAWC Warminster – Update –

December 4, 2019

Dan Goode and Lisa Senior
U.S. Geological Survey
Pennsylvania Water Science Center
U.S. Department of the Interior

in cooperation with U.S. Navy

PFAS detected in wells near Willow Grove and Warminster bases since 2014



2014 – 5 public supply wells shutdown
2016 – more supply wells shutdown after health advisory levels lowered

Map showing results of residential well sampling near Willow Grove and Warminster bases

Data from Navy and Air National Guard

Purpose of Current Modeling

- "To describe and improve understanding of groundwater flow rates and directions under various pumping scenarios by developing a preliminary numerical groundwater-flow model . ."

- "The **preliminary regional-scale model** may help identify data gaps and selection of additional monitoring locations, and will form the basis for a more refined model that incorporates additional detail and data as available to further improve understanding of groundwater flow and contaminant transport in the area."

USGS science for a changing world

From USGS-Navy Joint Funding Agreement

Purpose of Current Modeling (continued)

- Framework for synthesis of hydrogeologic understanding, field tests, and monitoring data
- Establish regional groundwater fluxes for use in higher-resolution models of smaller areas
- Delineate areas that are regionally downgradient of contaminant source areas at bases
- Compare flow paths for selected years having different recharge and pumping, 1999 – 2017
- Provide a tool for management decision making – How will future pumping scenarios affect flow paths?

Regional Groundwater Flow Model near Willow Grove and Warminster

- Hydrogeologic setting
- Model description
- Model results, including:
  - Simulated flow paths from PFAS sources
  - Groundwater-surface water relations
  - Limitations

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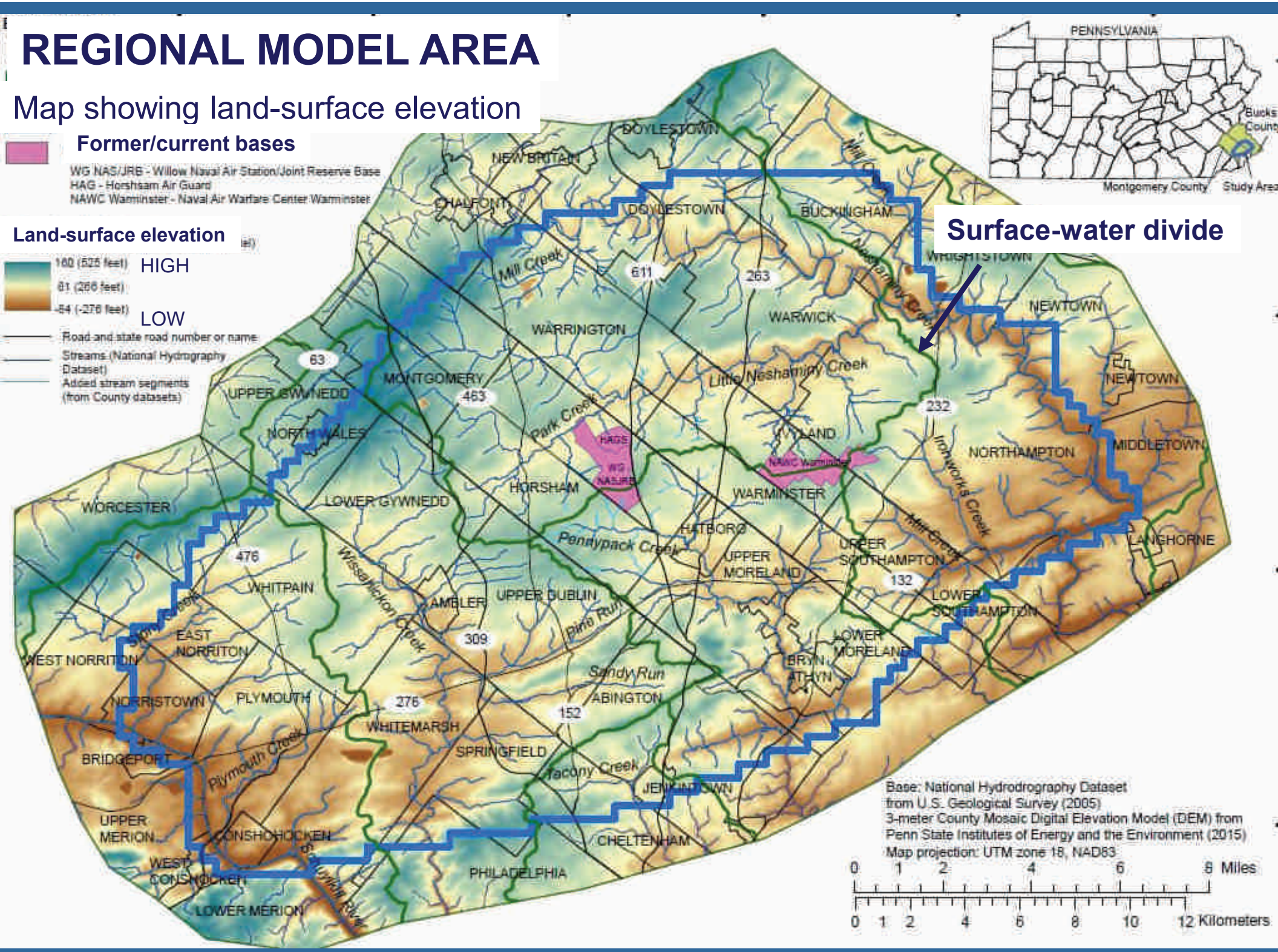
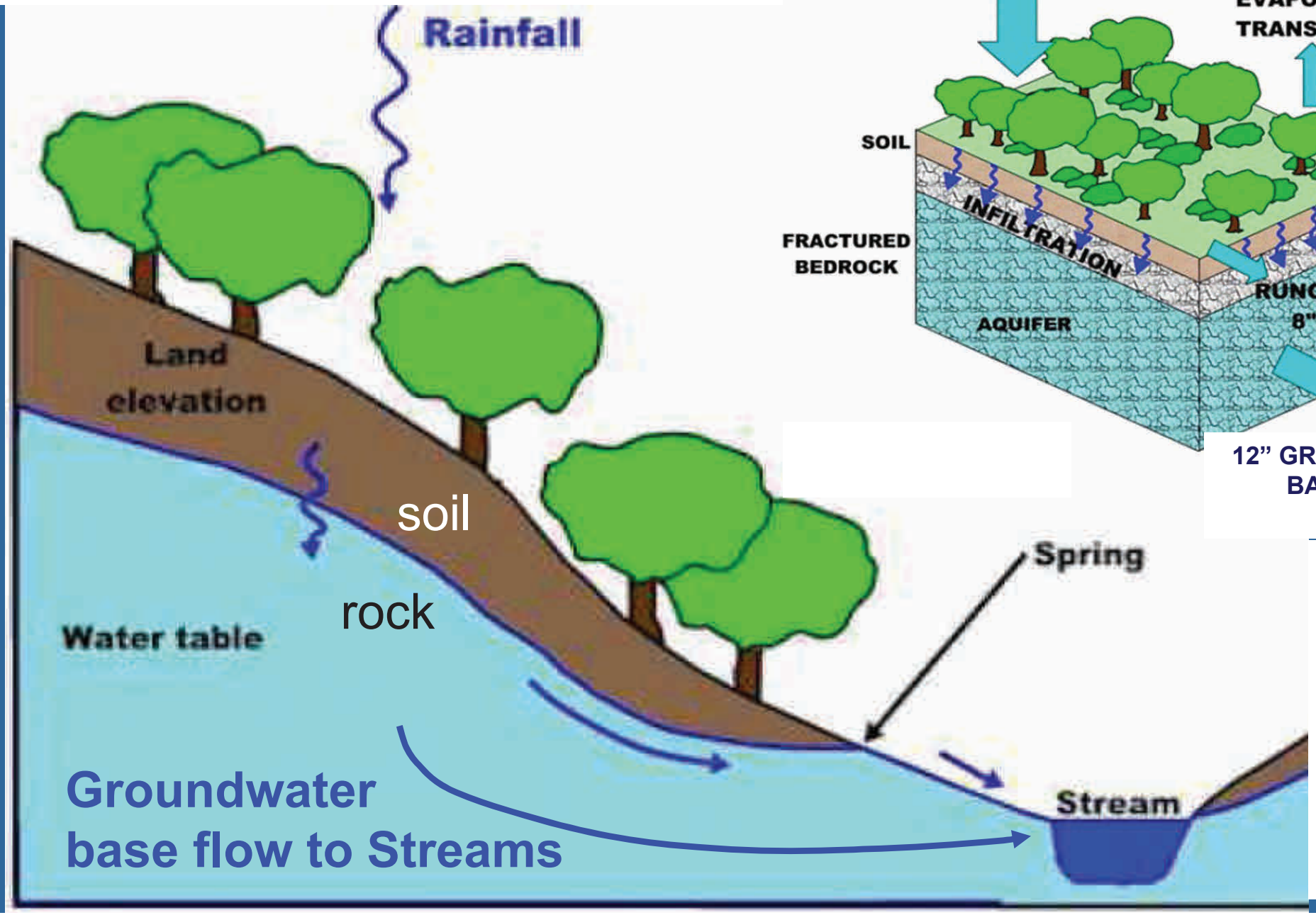
REGIONAL MODEL AREA

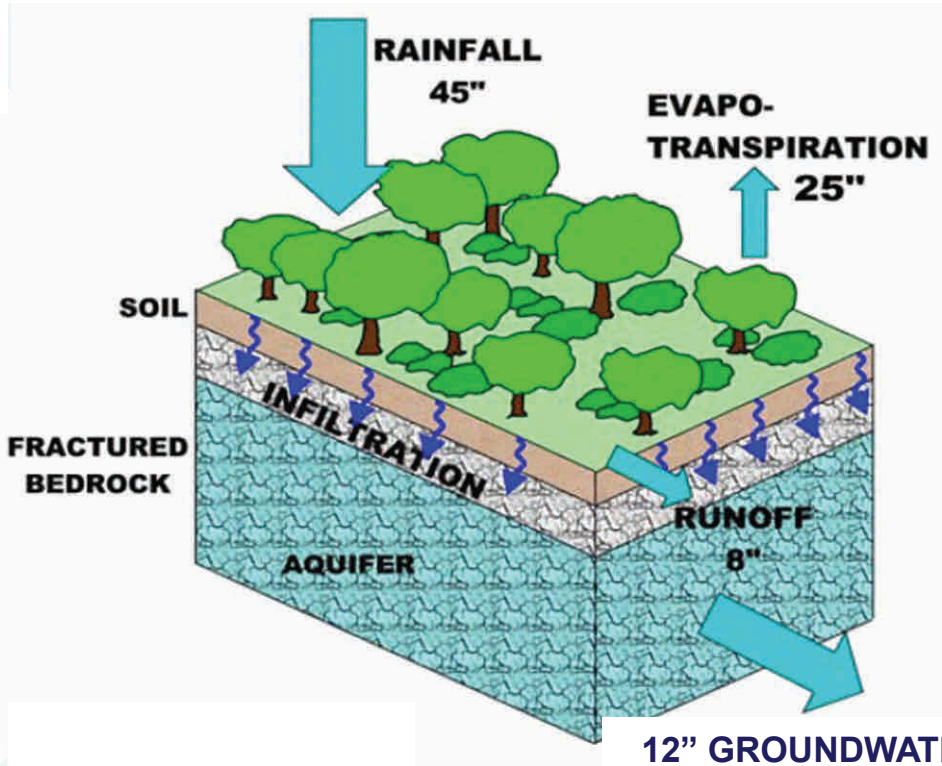
Map showing land-surface elevation



Groundwater system in fractured bedrock and overlying weathered rock and soil, common in Piedmont of eastern United States

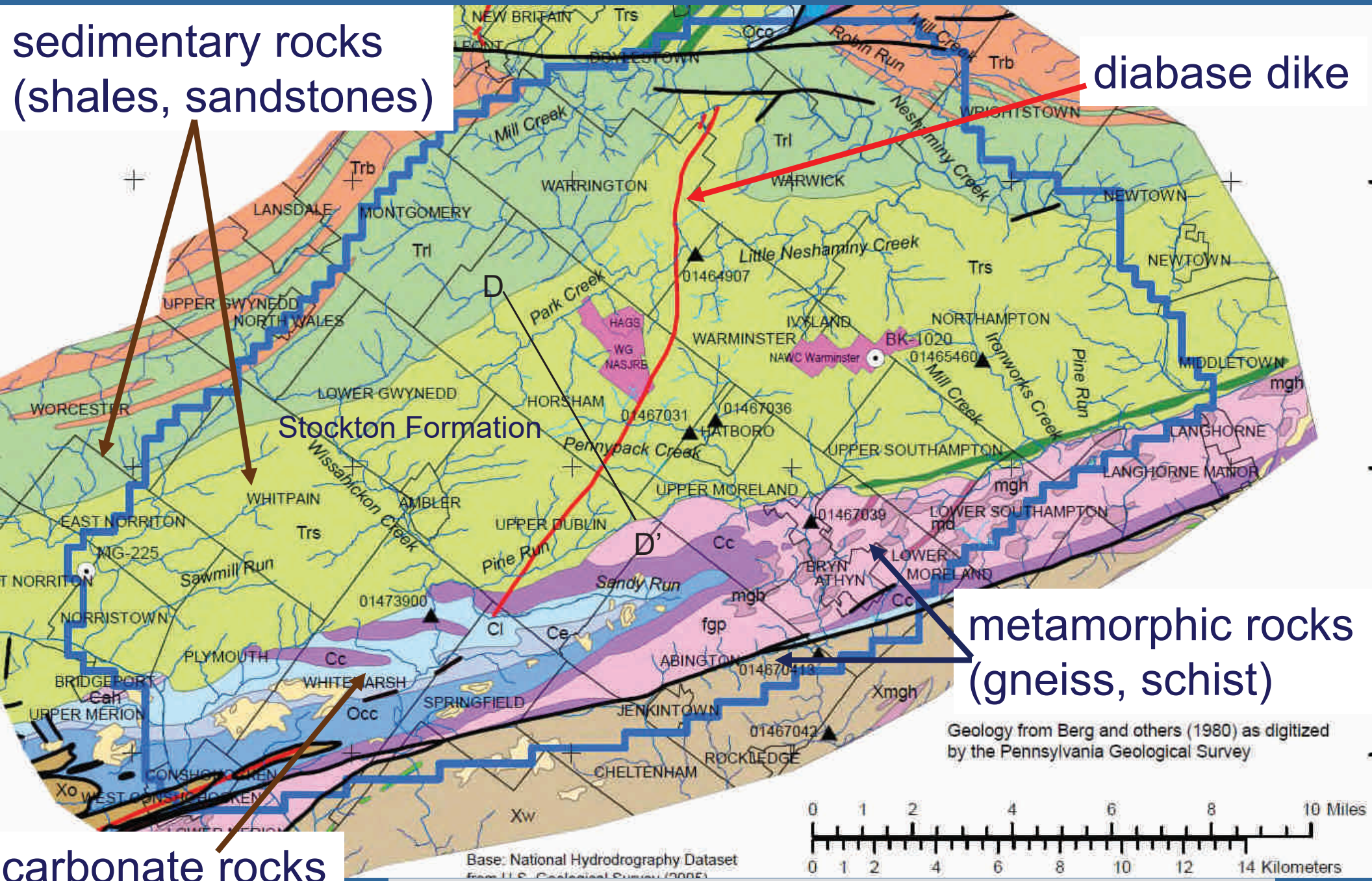


Water budget for Piedmont Region, PA



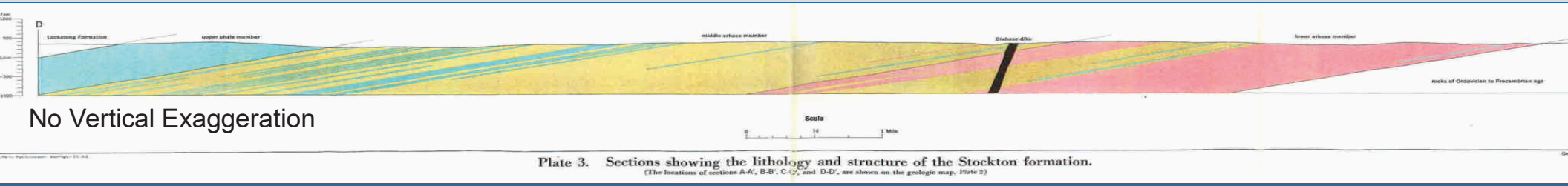
12" GROUNDWATER BASE FLOW TO STREAMS

Figures modified from Pennsylvania Department of Environmental Protection, 2006.



BEDROCK GEOLOGY IN MODEL AREA

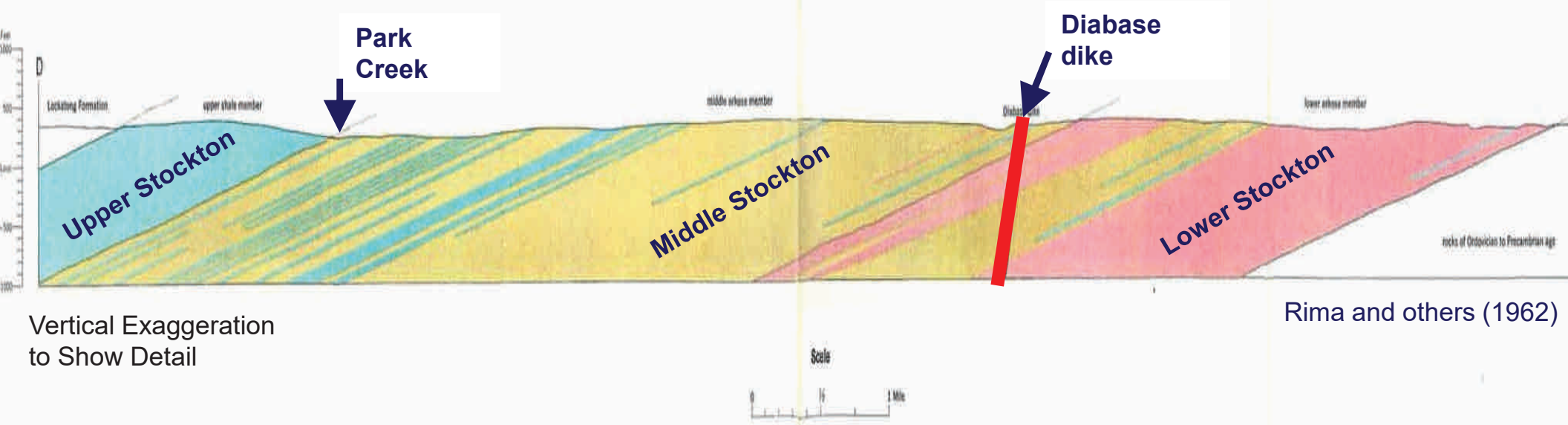
Geologic Cross Section near Willow Grove NASJRB showing dipping beds of the Stockton Formation (sandstone, siltstone, mudstone)



No Vertical Exaggeration

Plate 3. Sections showing the lithology and structure of the Stockton formation.
(The locations of sections A-A', B-B', C-C', and D-D', are shown on the geologic map, Plate 2)

NW SE



Vertical Exaggeration to Show Detail

Rima and others (1962)

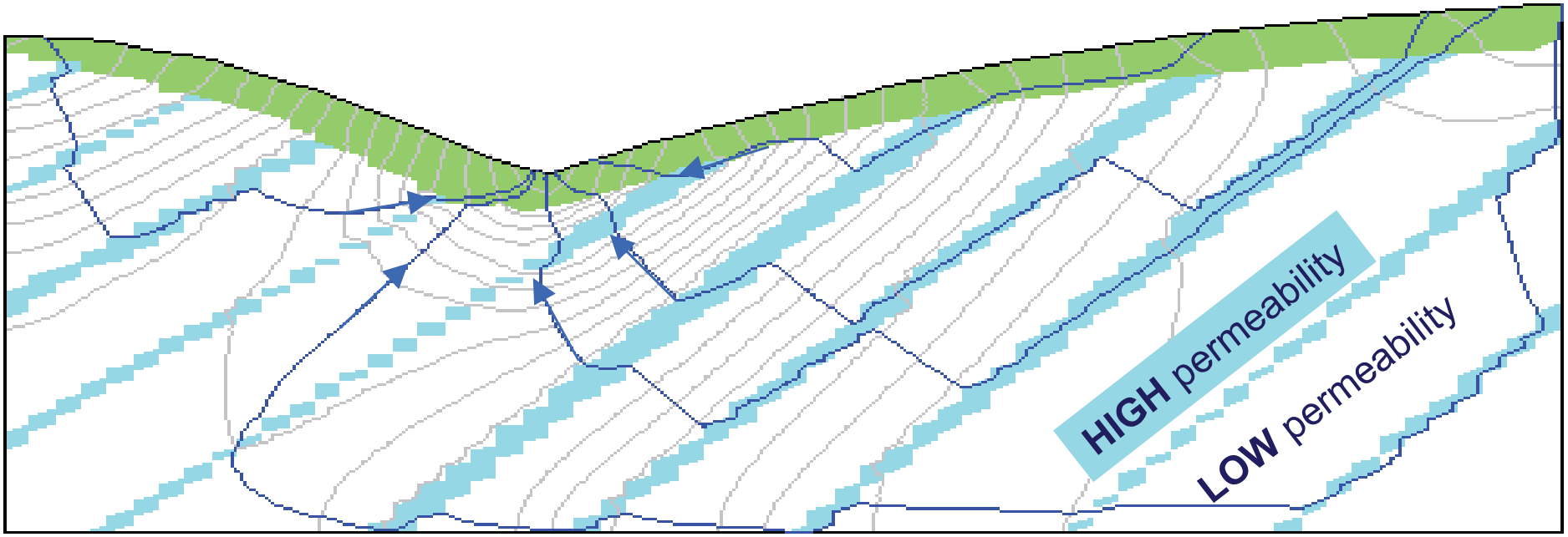
Geologic structure can affect groundwater flow -
Beds of different lithologies and flow properties dip to the northwest;
Diabase dike (magma sheet intruded into overlying strata) generally restricts cross-flow.

USGS science for a changing world

2018 Field Conference of Pennsylvania Geologists

Dipping beds of sandstone and shale

Groundwater Flow in Dipping Sedimentary Rock Layers



HIGH- and **LOW**-permeability beds

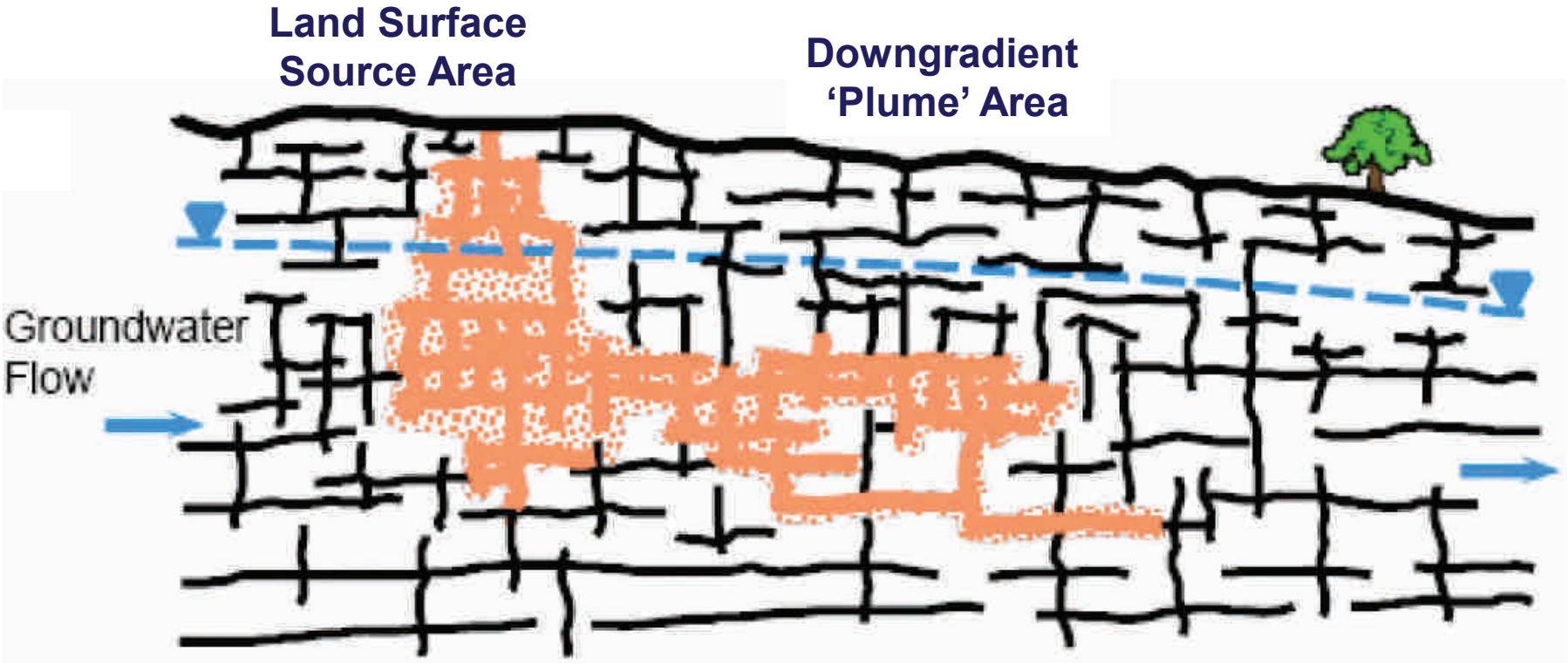
Rapid focused flow in high-permeability beds

Preferred regional flow in strike direction along bedding planes (into or out of the board)

Figure modified from Risser and Bird (2003)

Non-Uniform Properties in Different Fractures
Variable Connectivity Between Fractures

Flow and Contaminant Transport Mostly in Fractures, Limited in Unfractured Rock



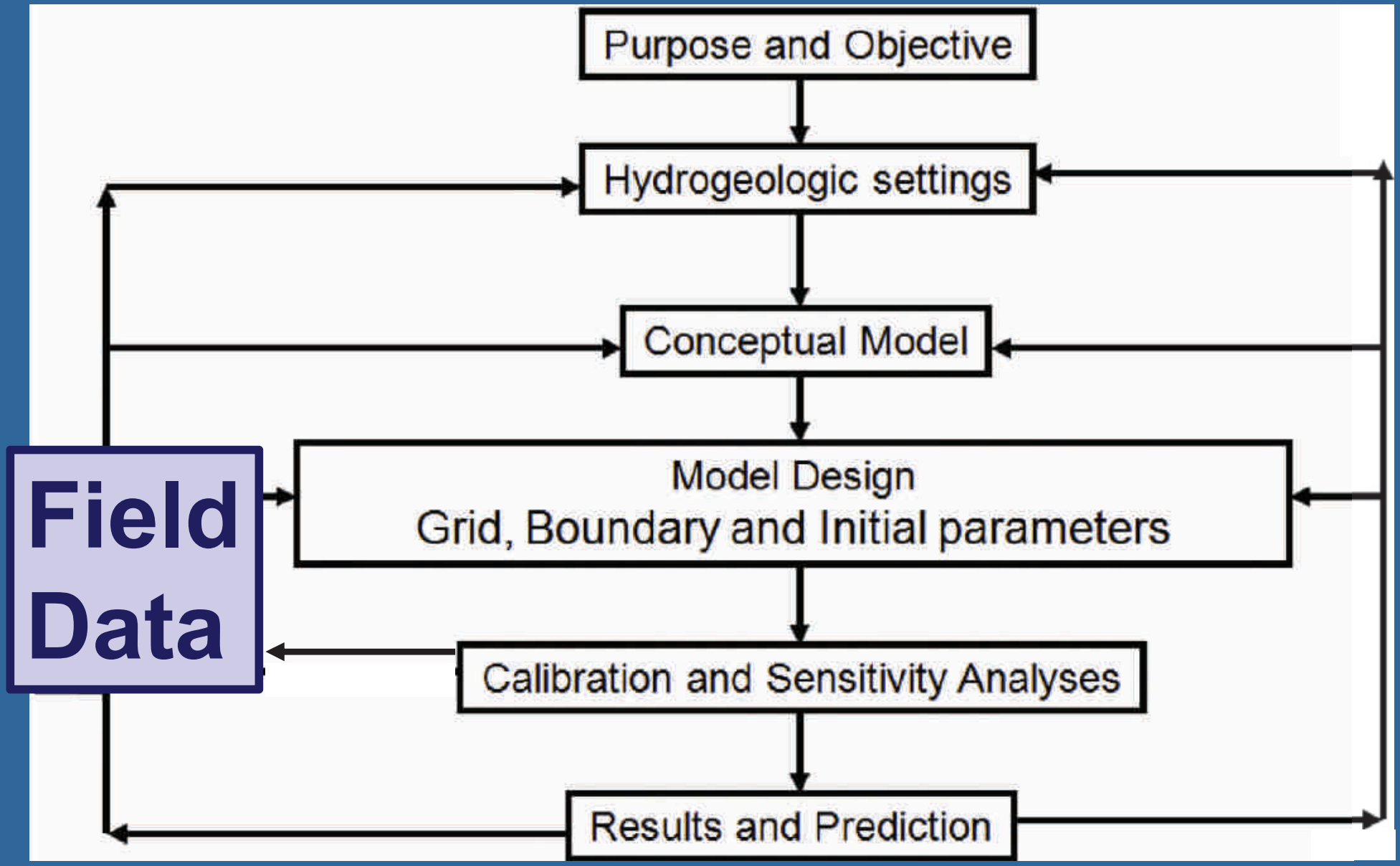
Modified from Parker (2007)

Individual Fractures are Non-Uniform at Even Smaller Scales

Focused groundwater discharge from isolated points along fractures in sandstone on road cut

www.youtube.com/watch?v=npFt8IZSVpI

MODEL DEVELOPMENT AND REFINEMENT



USGS
science for a changing world

after Li and others (2015)

Regional Groundwater Model near Willow Grove and Warminster

Calibrate model with 1999, 2010, 2013, 2016 data

Simulate directions of regional groundwater flow that can carry dissolved PFOS, PFOA, and other PFAS

Pumping scenarios near bases:

1999 – WG base active, regional pumping rates large

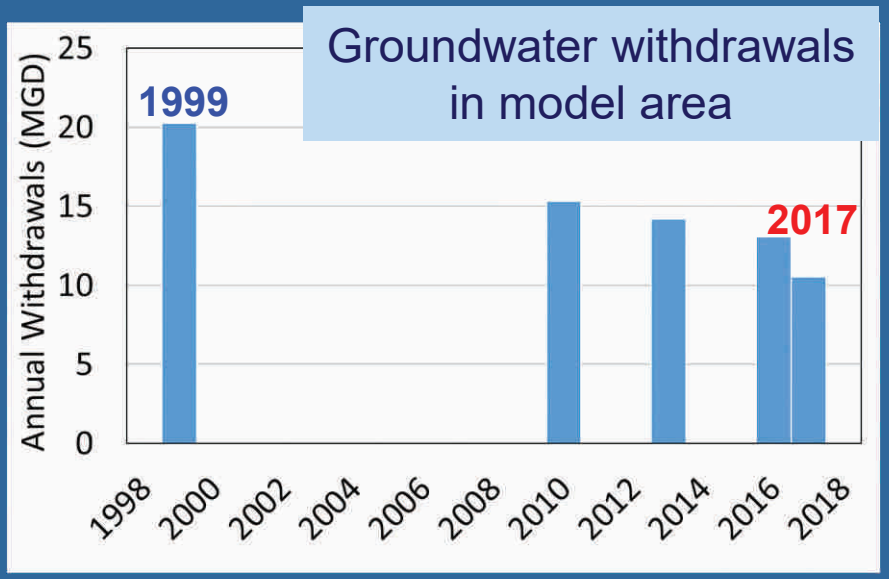
2010 – WG base active, pumping rates reduced

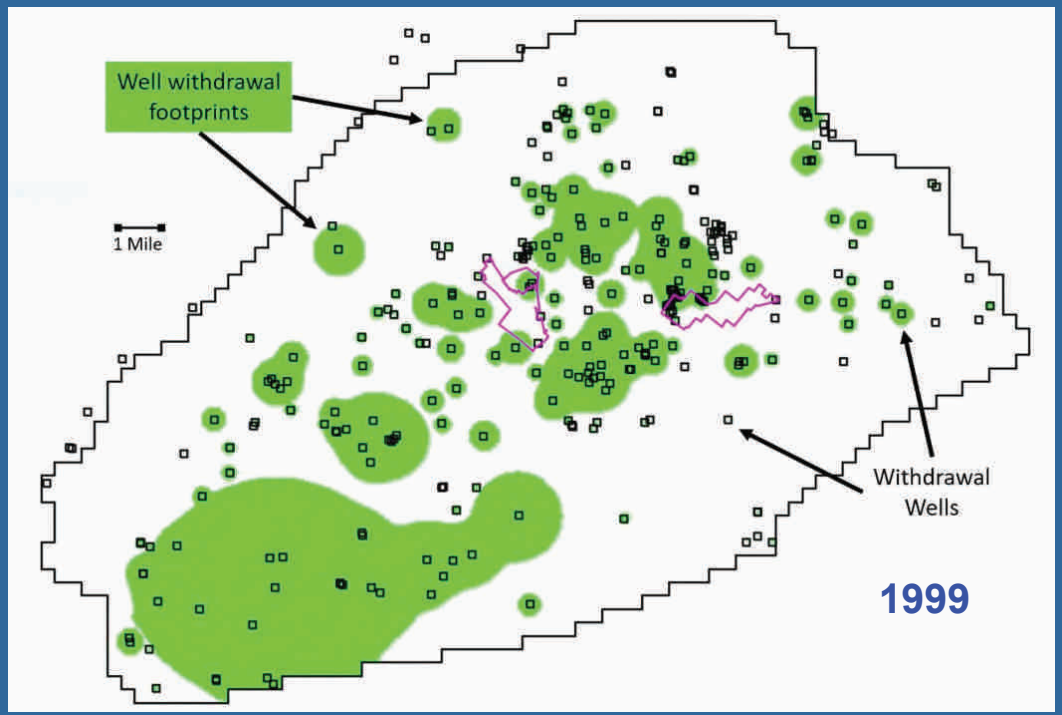
2013 – WG base closed, pumping reduced

2016 – WG base closed, >5 supply wells shutdown

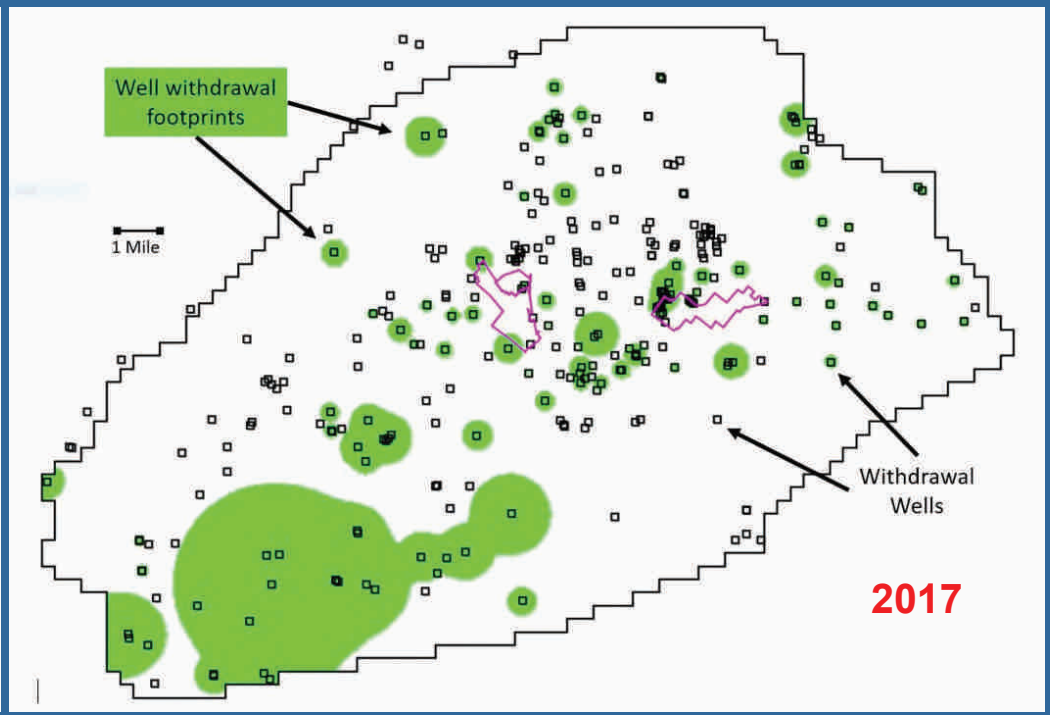
2017 – WG base closed, ~13 supply wells shutdown

Groundwater Pumping near Bases Decreased Substantially from 1990s to 2017





Withdrawal Volume 'Footprint' for 1999



Withdrawal Volume 'Footprint' for 2017

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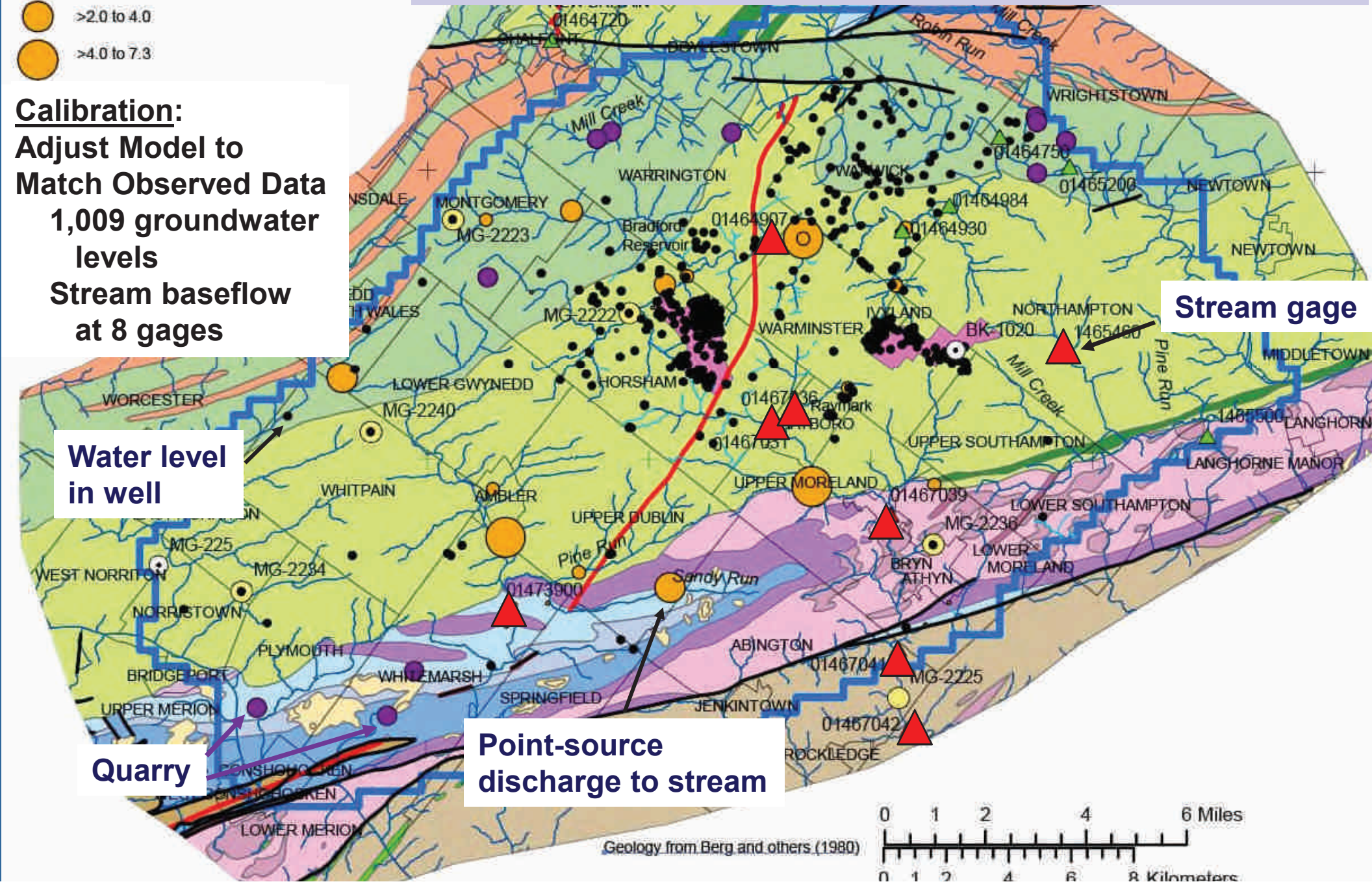
Data from Pennsylvania Dept. of Environmental Protection and USGS (1998)
Map method after Goode (2016)

Locations of model calibration data (stream gages, groundwater levels) and Specified discharges, withdrawals other than wells

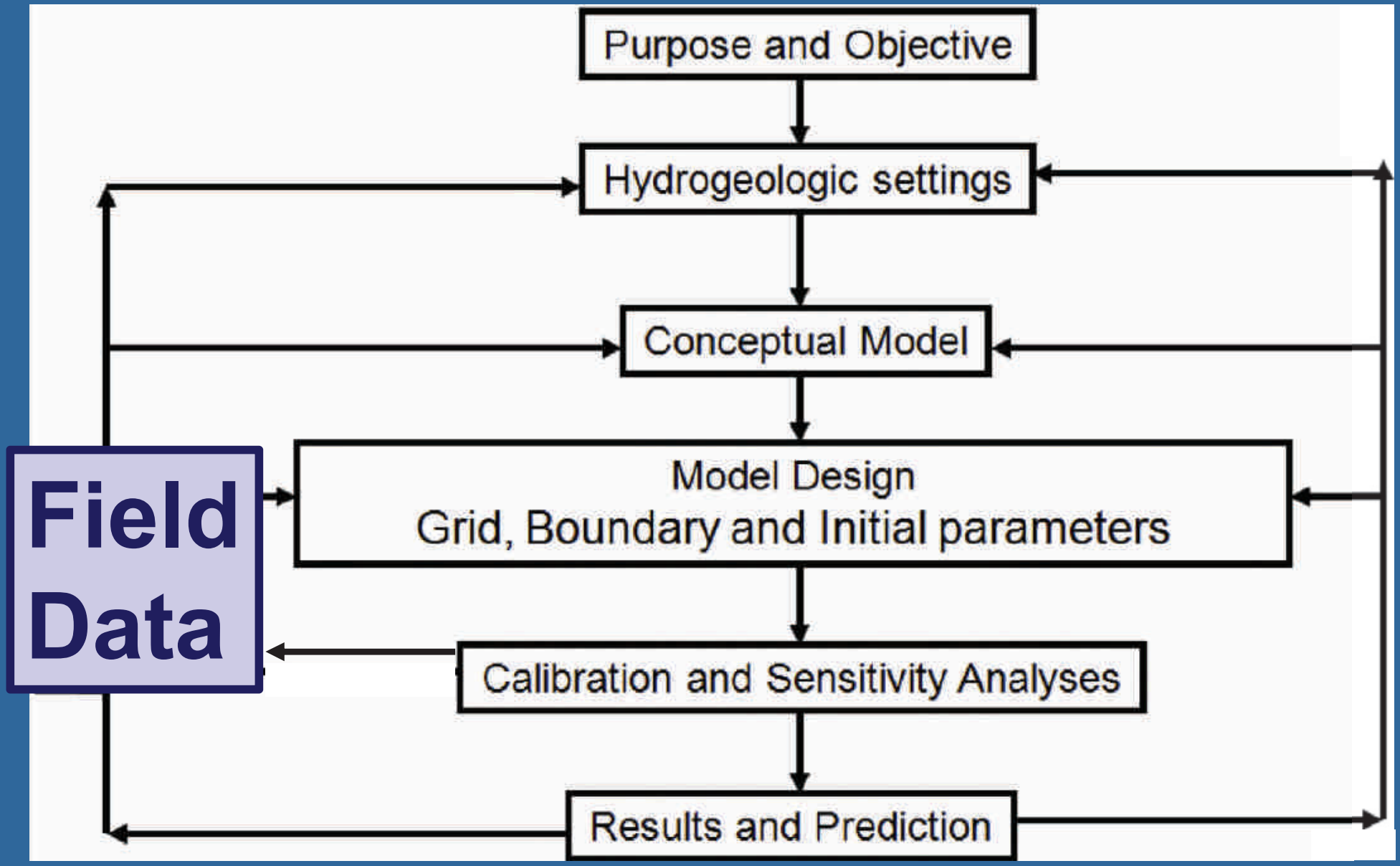
Point-source discharge to streams, in cfs

- >0.1 to 1.0
- >1.0 to 2.0
- >2.0 to 4.0
- >4.0 to 7.3

Calibration:
Adjust Model to Match Observed Data
- 1,009 groundwater levels
- Stream baseflow at 8 gages

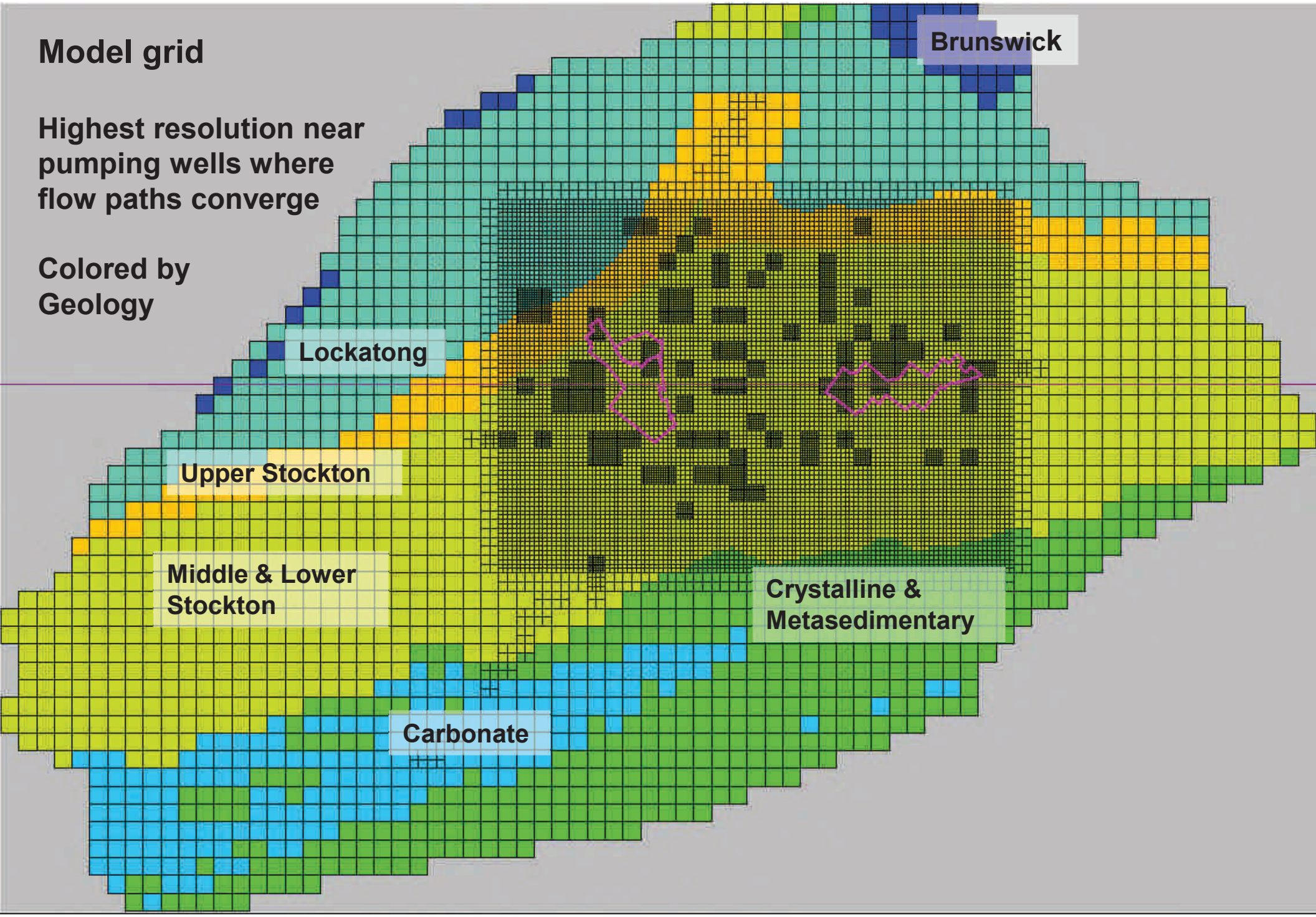


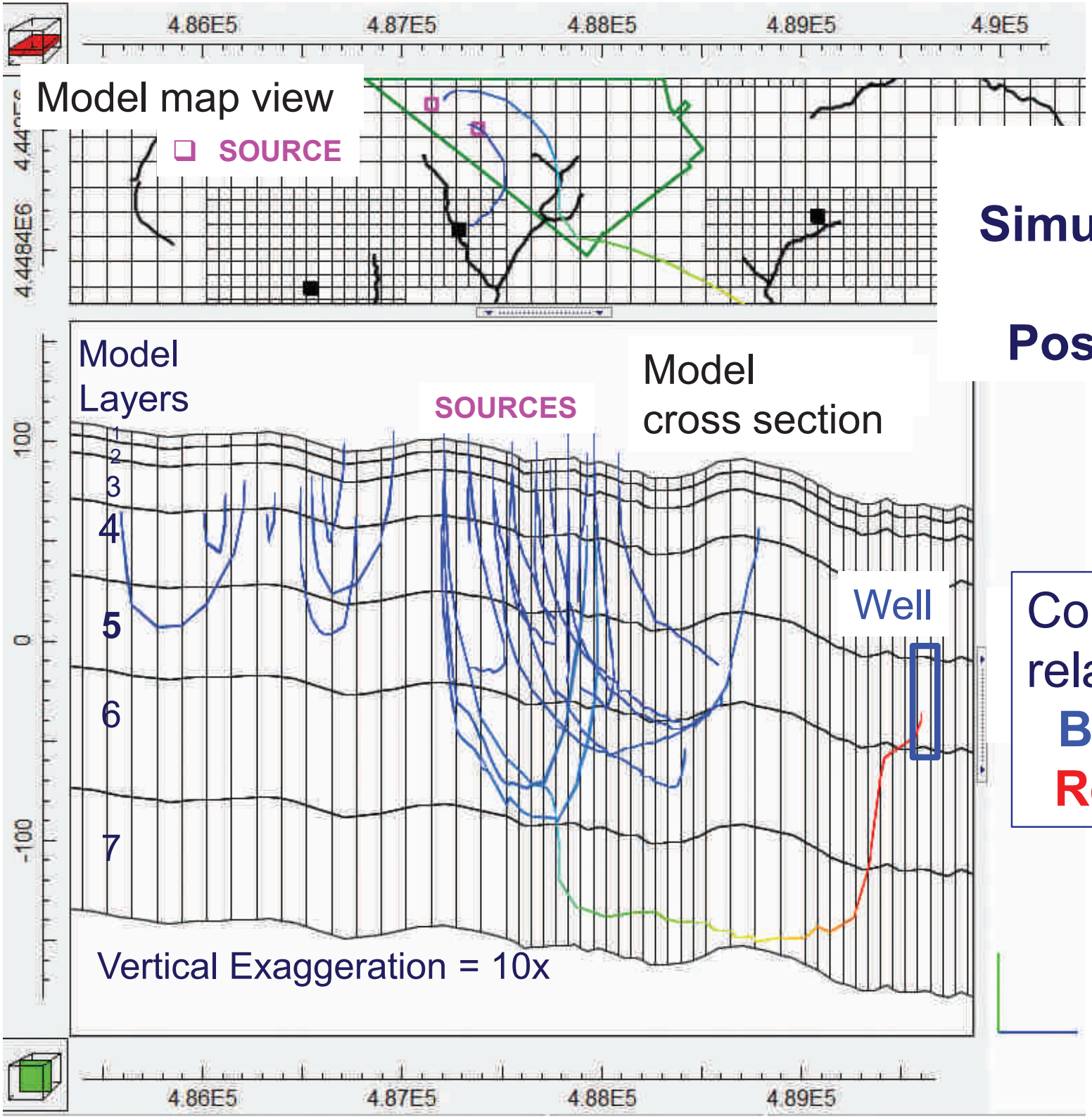
MODEL DEVELOPMENT AND REFINEMENT



USGS
science for a changing world

after Li and others (2015)


Model grid
Highest resolution near pumping wells where flow paths converge
Colored by Geology
Brunswick
Lockatong
Upper Stockton
Middle & Lower Stockton
Crystalline & Metasedimentary
Carbonate



Illustrative Simulated 3D Flow Paths from Possible Sources

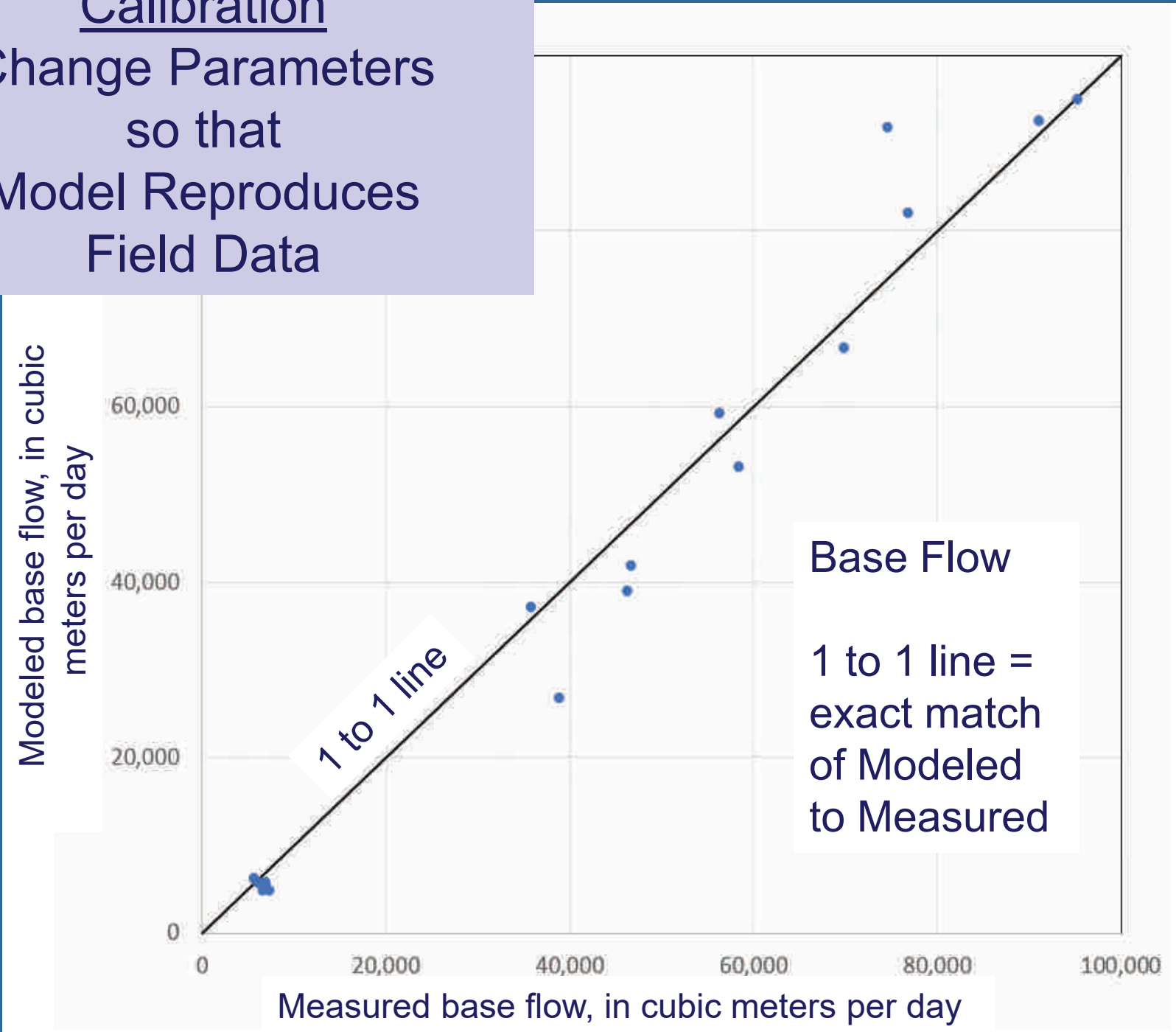
Color shows relative travel time

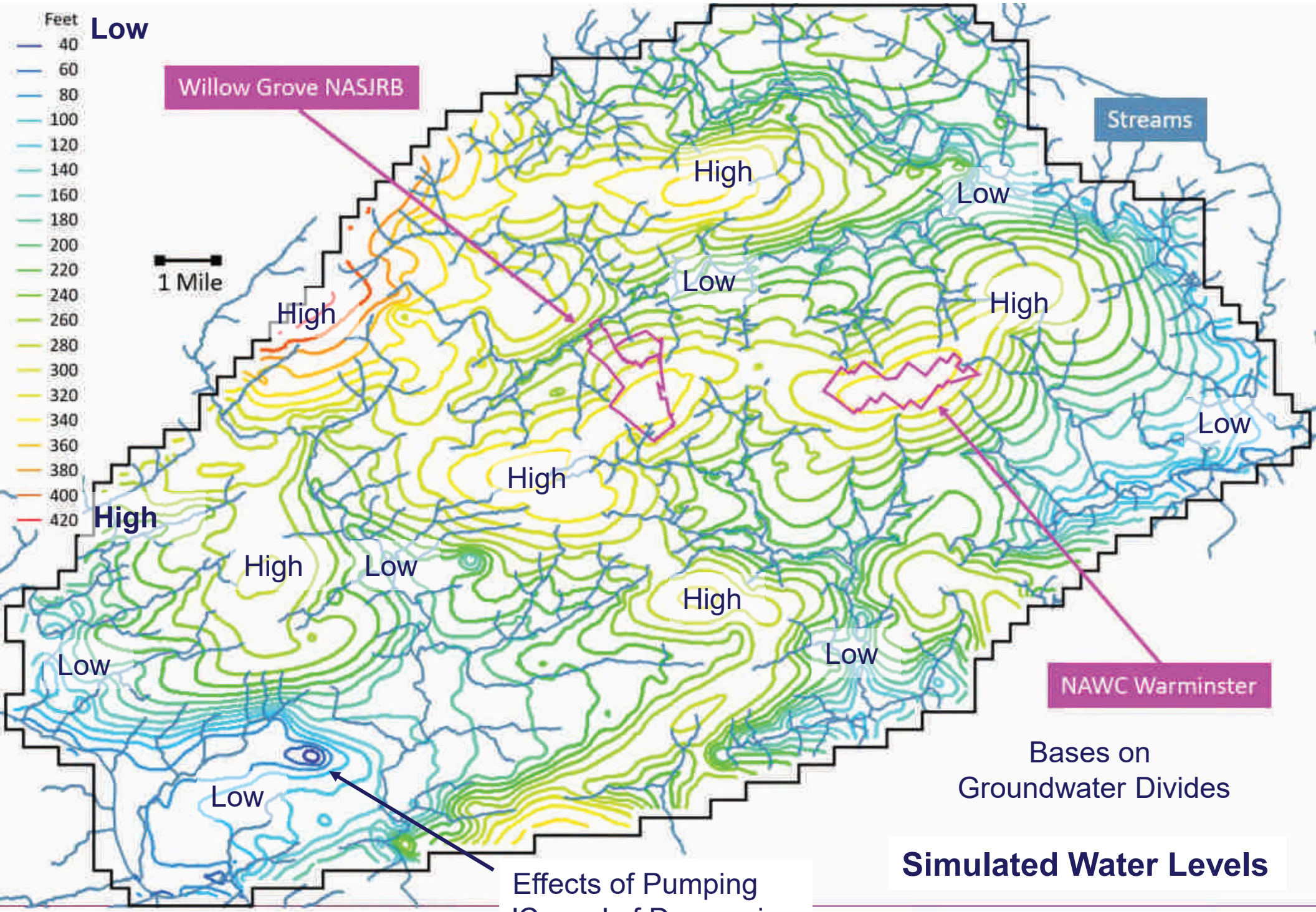
Blue – Short

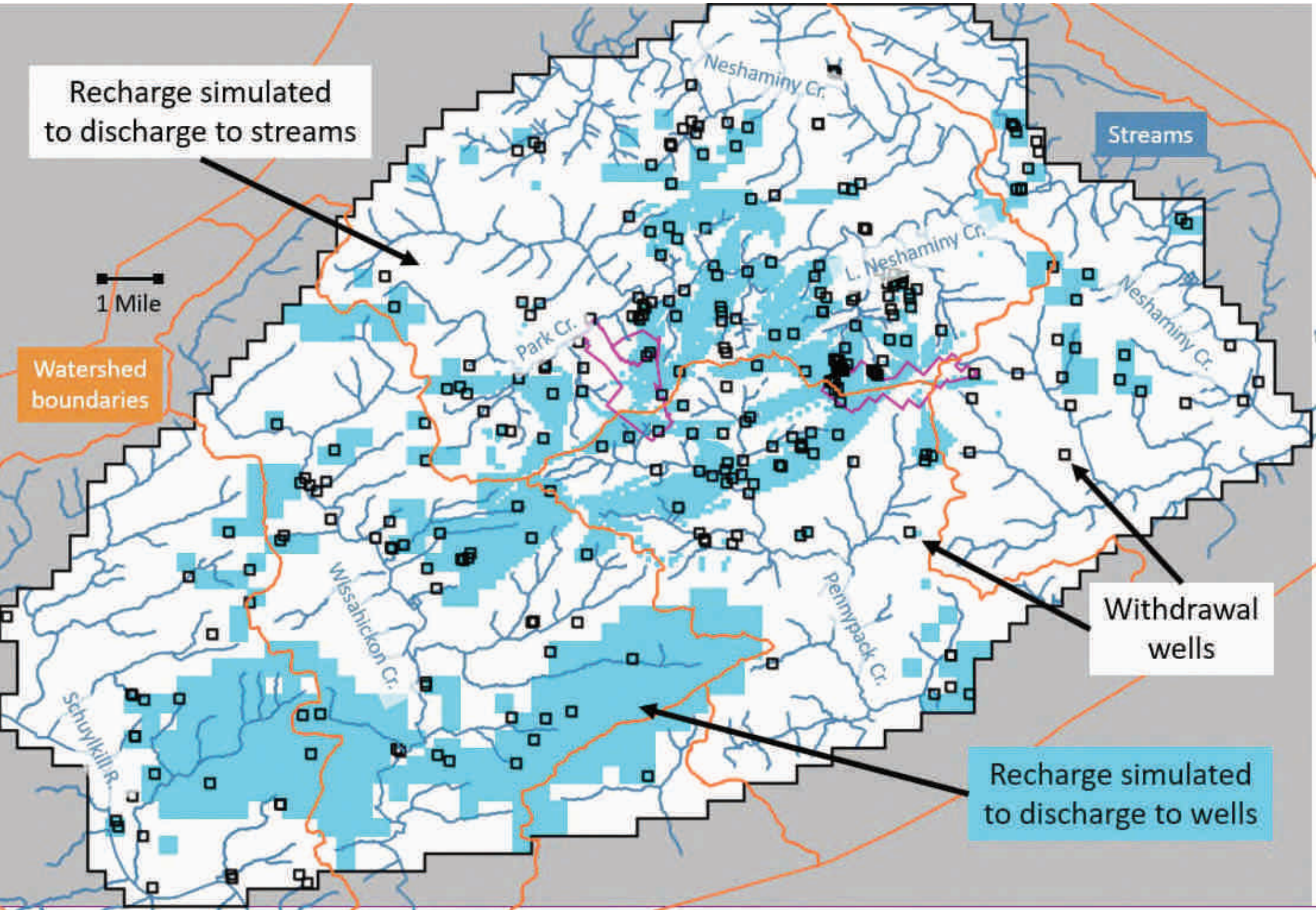
Red – Long

Calibration

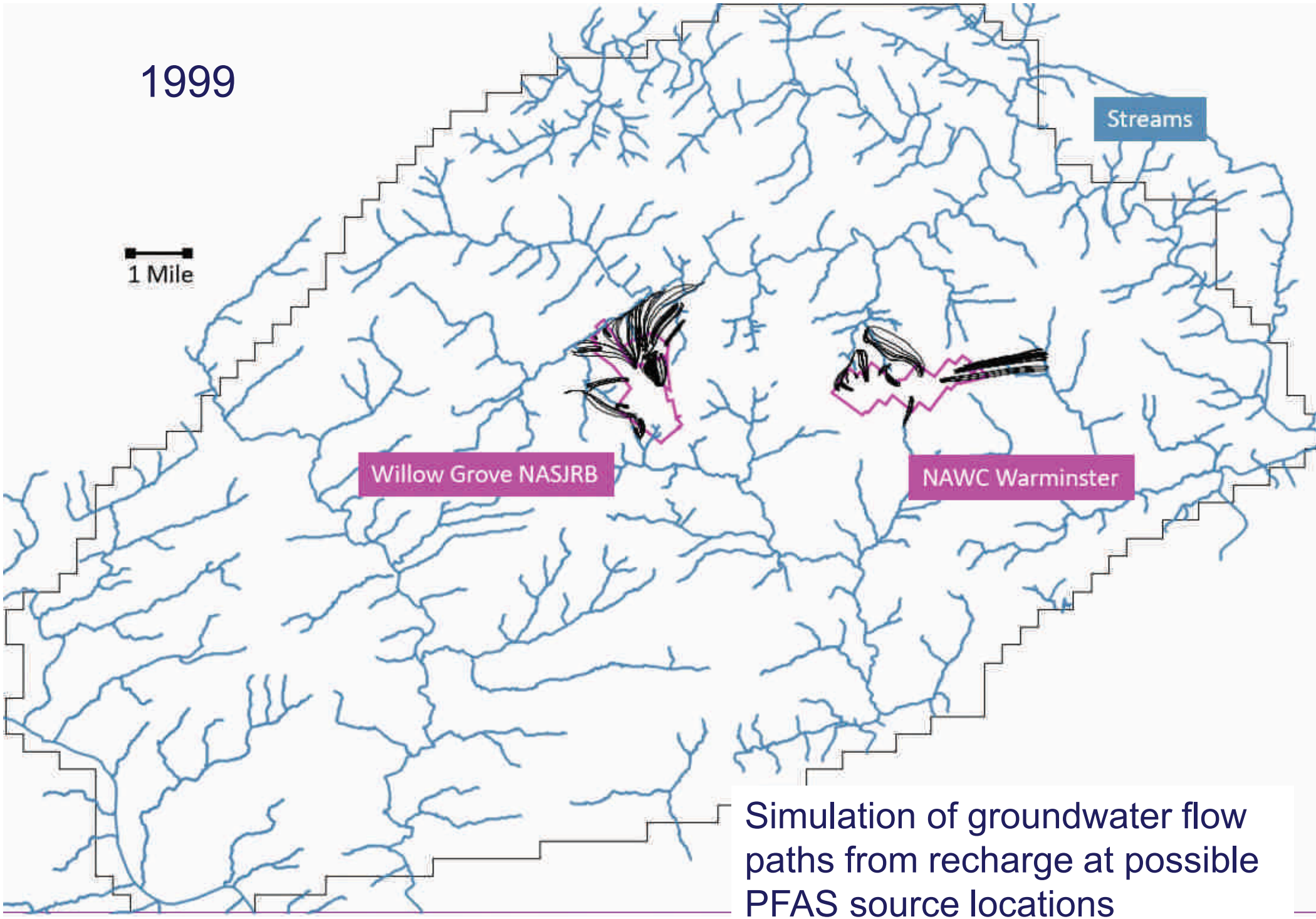
Change Parameters
so that
Model Reproduces
Field Data



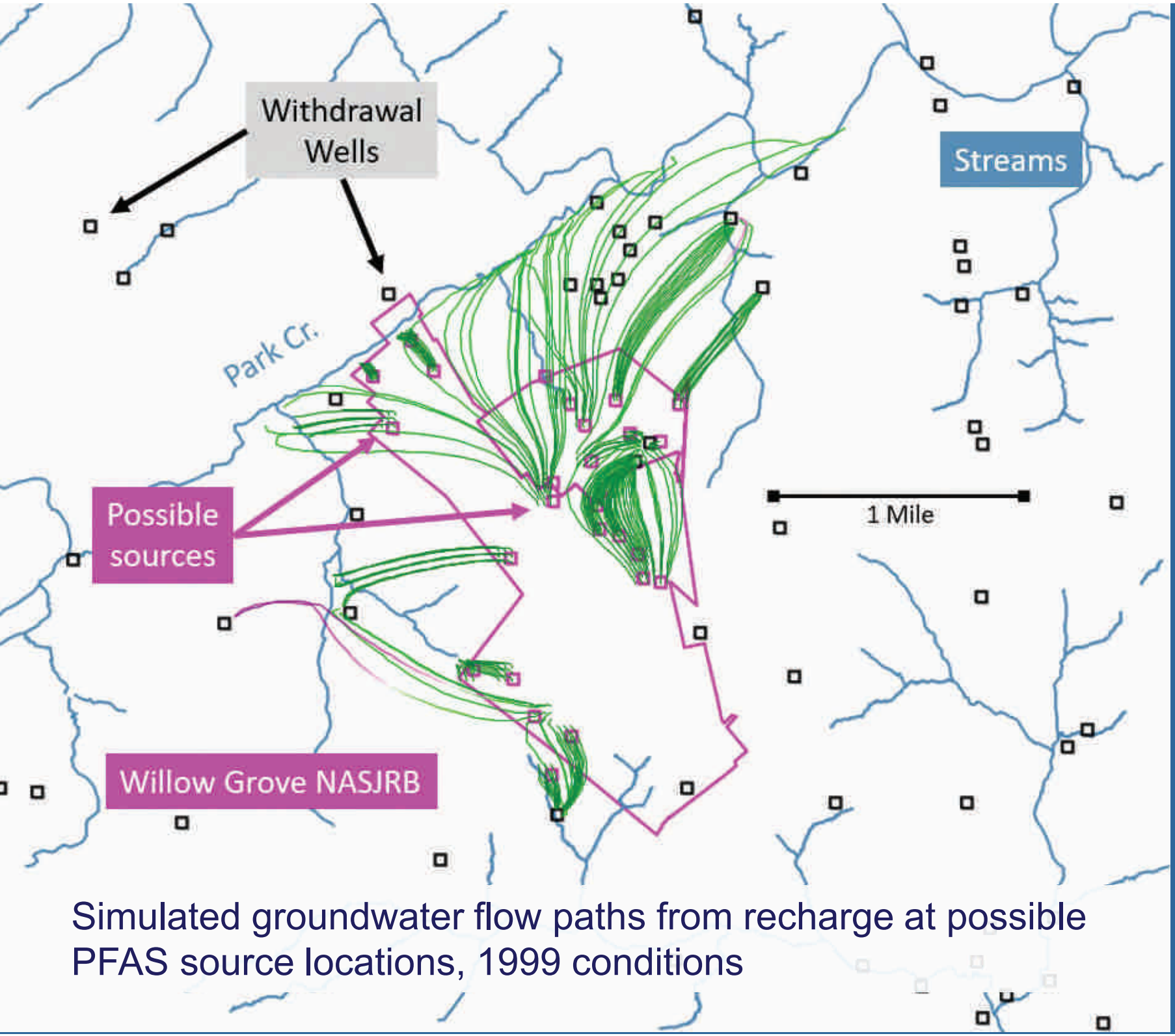

Feet
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
Low
High
1 Mile
Willow Grove NASJRB
Streams
High
Low
Low
High
High
Low
High
High
Low
High
Low
Low
High
Low
Low
NAWC Warminster
Bases on
Groundwater Divides
Effects of Pumping
'Cones' of Depression
Simulated Water Levels



Model simulates where recharge discharges to streams or to wells

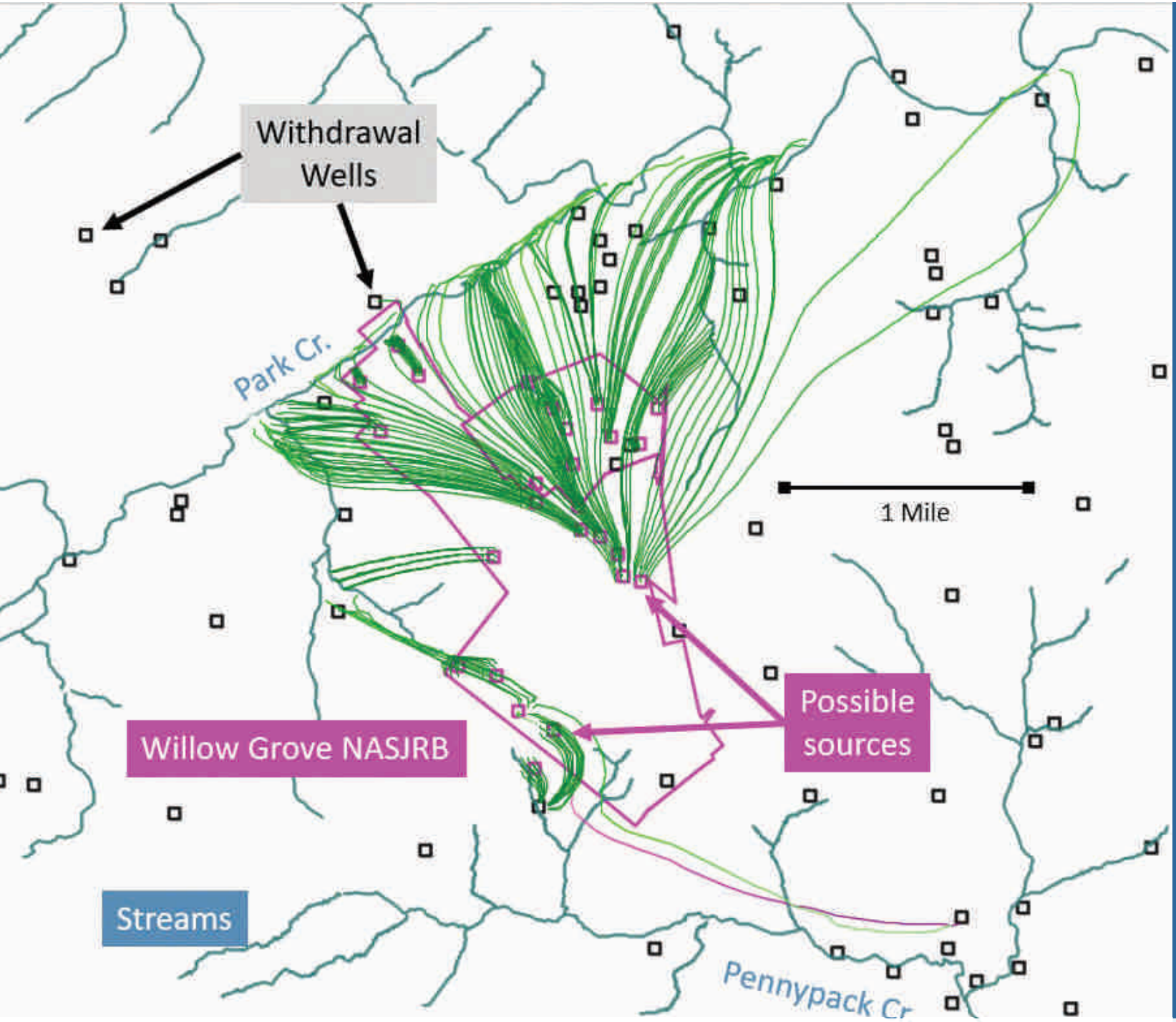


Simulation of groundwater flow paths from recharge at possible PFAS source locations



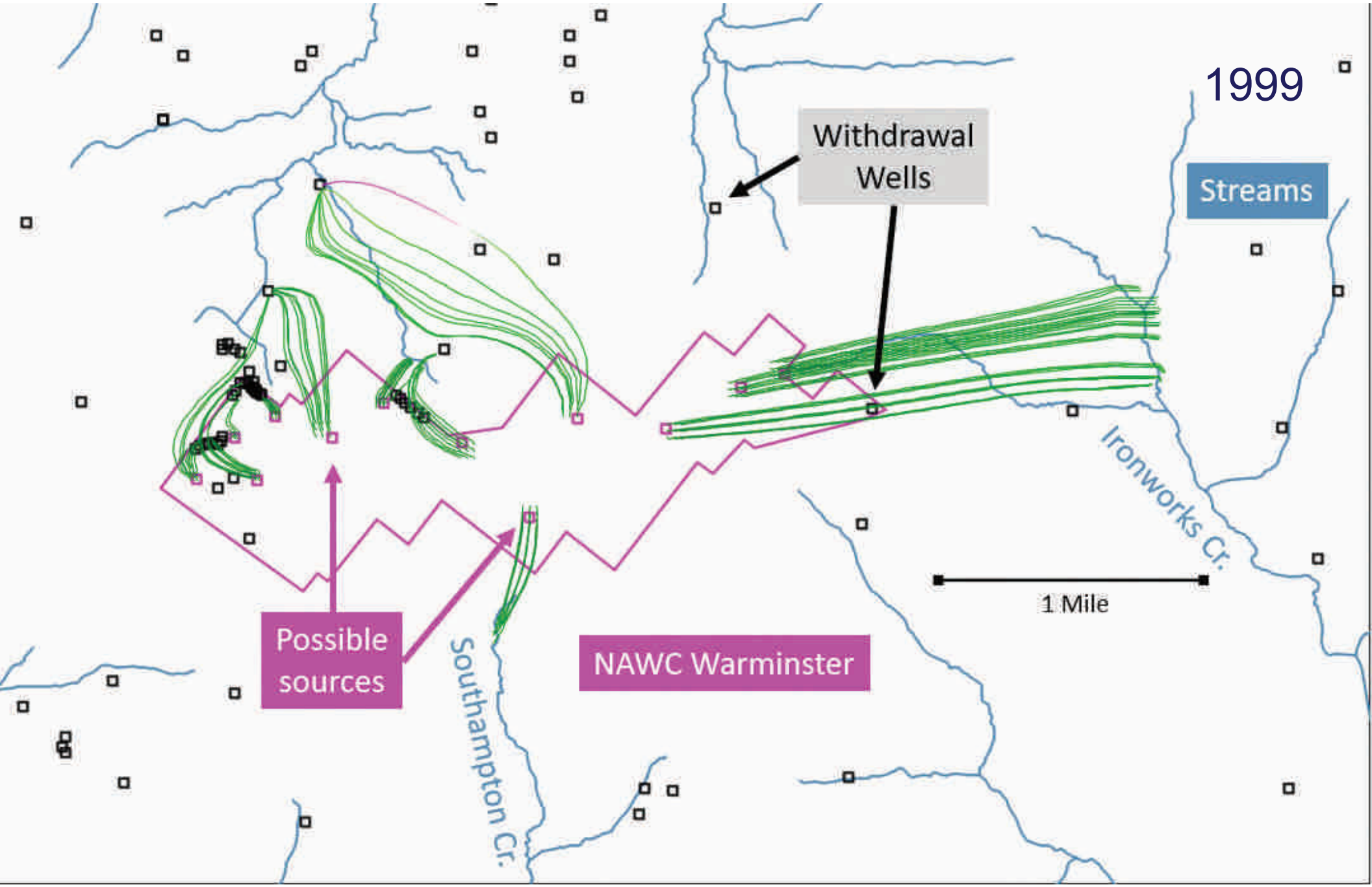
1999

Simulated groundwater flow paths from recharge at possible PFAS source locations, 1999 conditions

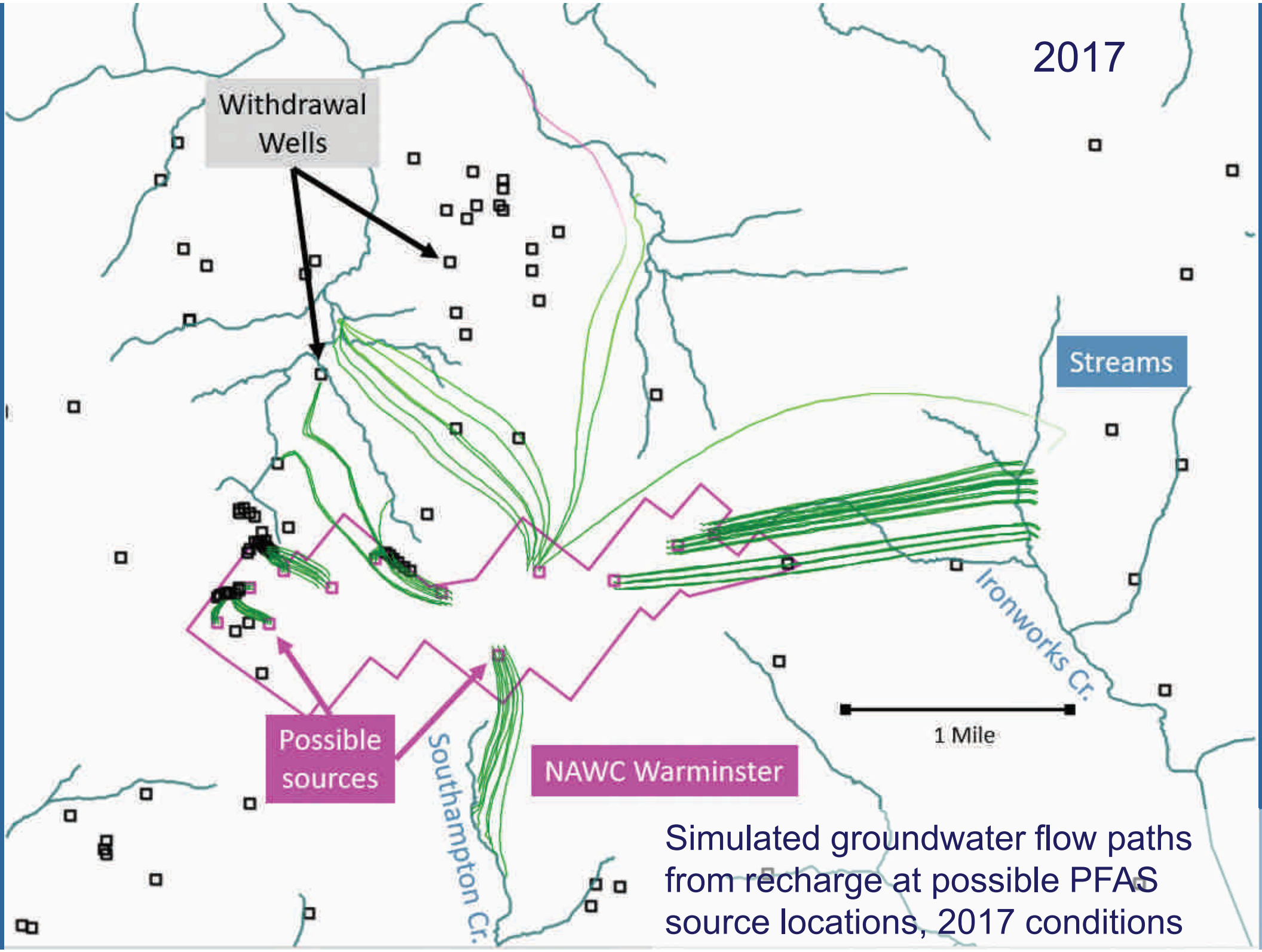


2017

Simulated groundwater flow paths from recharge at possible PFAS source locations, 2017 conditions

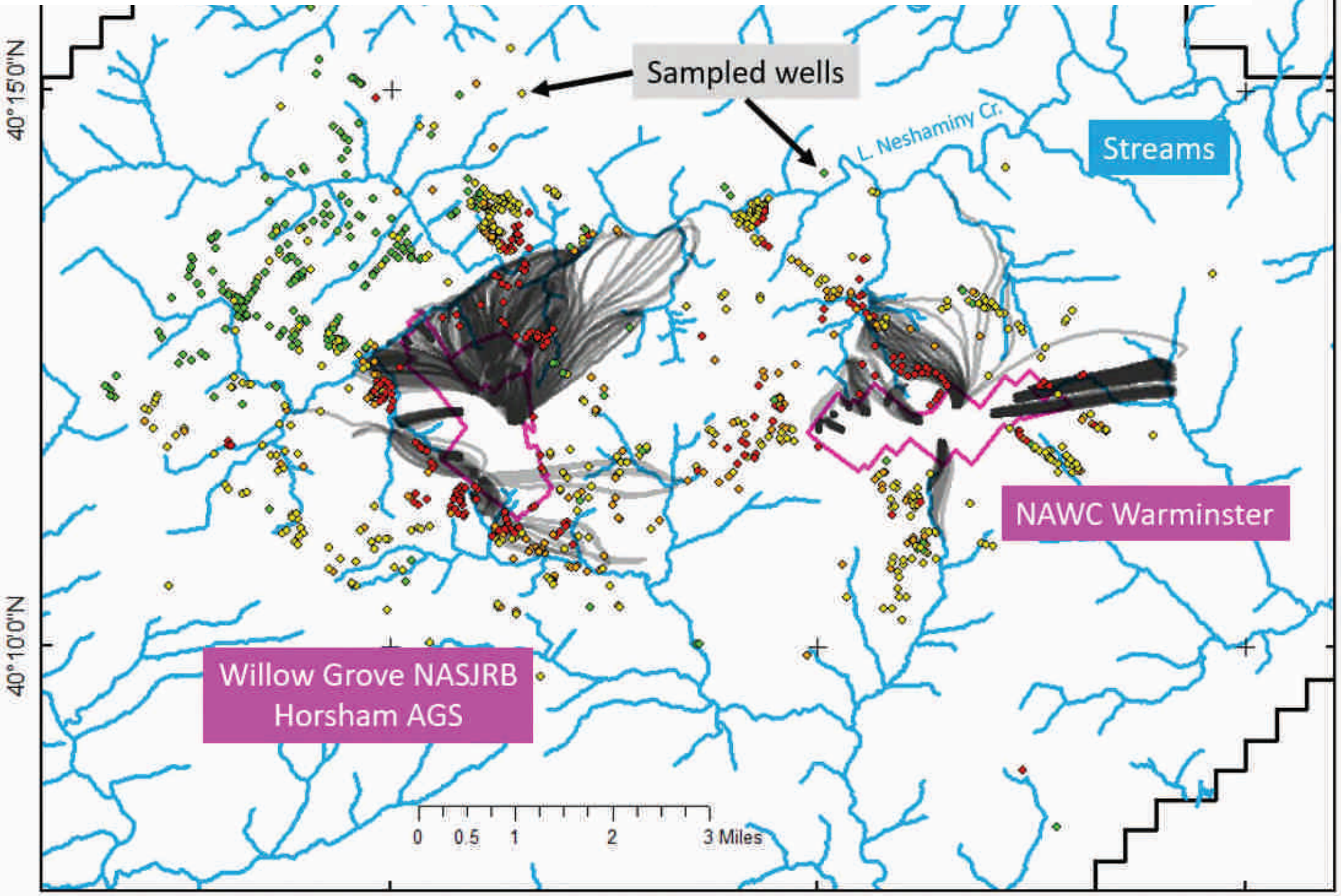


Simulated groundwater flow paths from recharge at possible PFAS source locations, 1999 conditions



Simulated groundwater flow paths from recharge at possible PFAS source locations, 2017 conditions

Simulated flow paths from sources, all scenarios (1999, 2010, 2013, 2016, 2017) and PFOA+PFOS levels in residential wells



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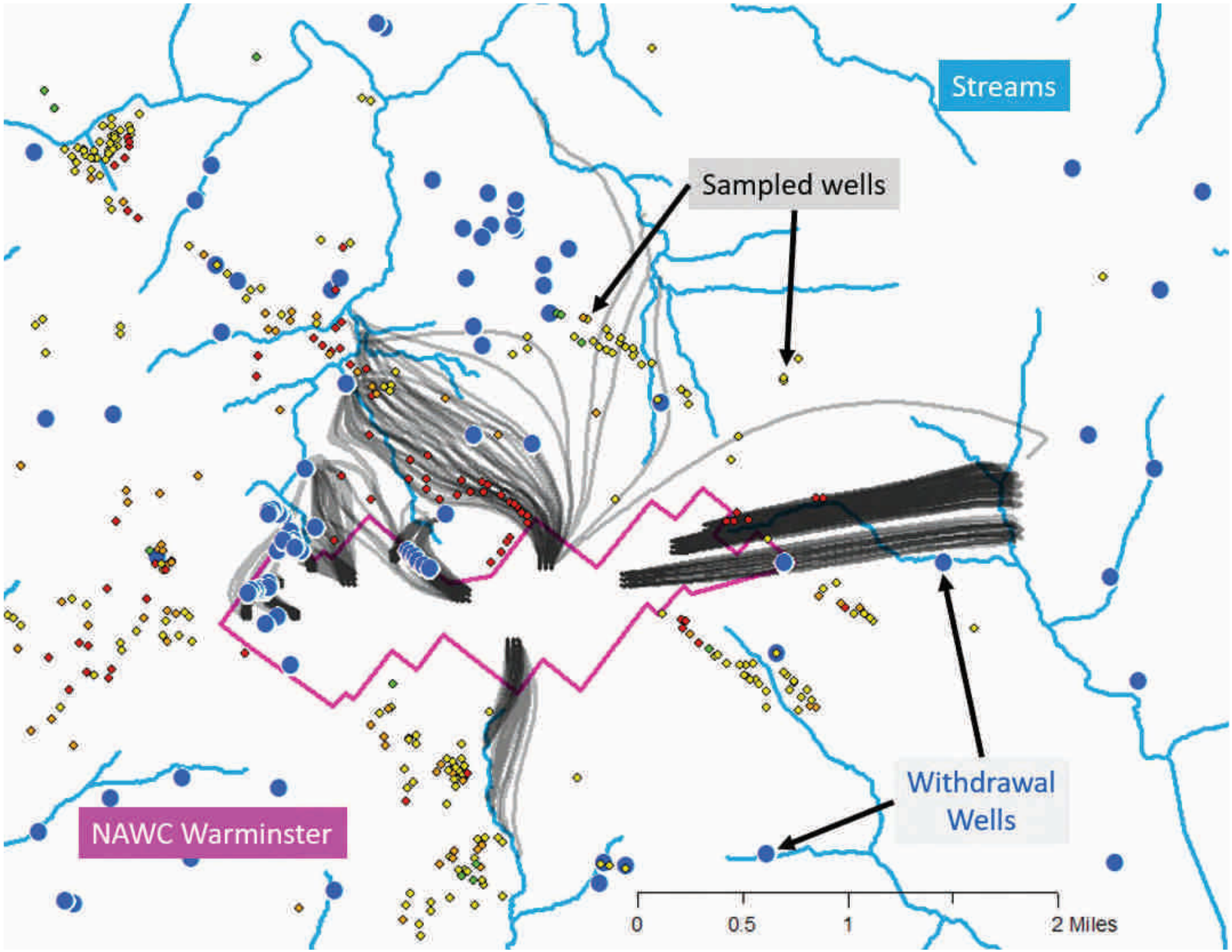
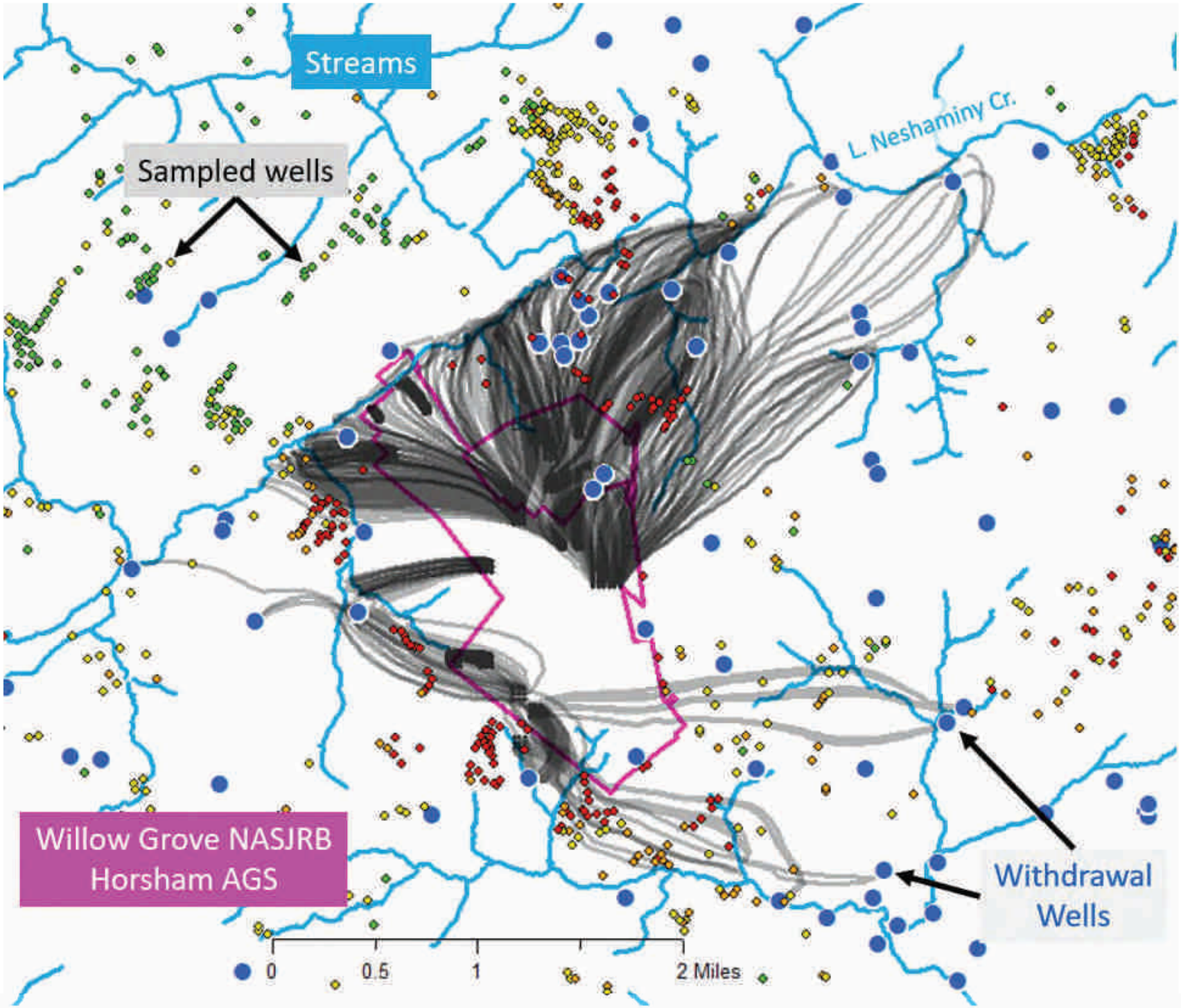
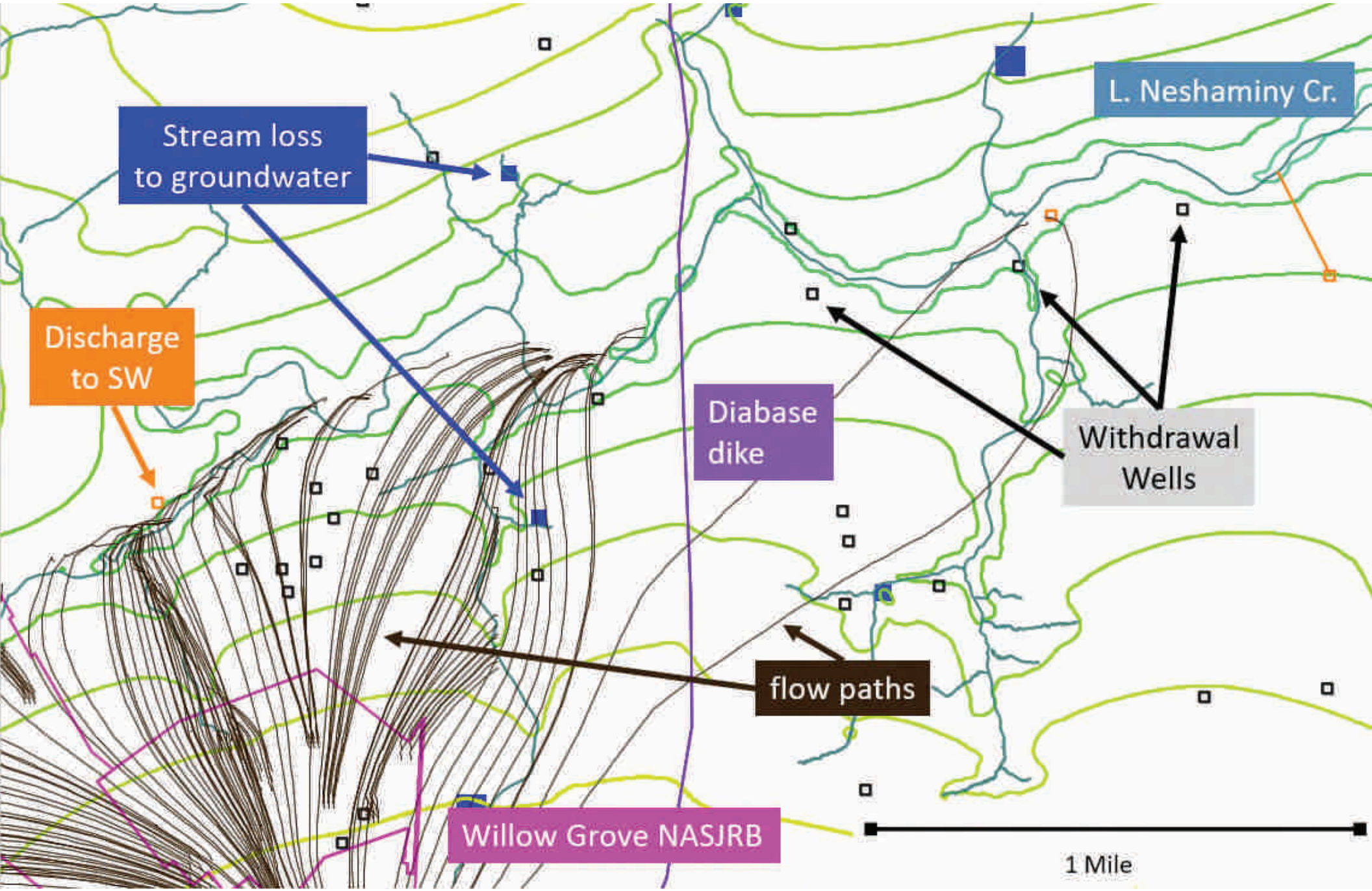


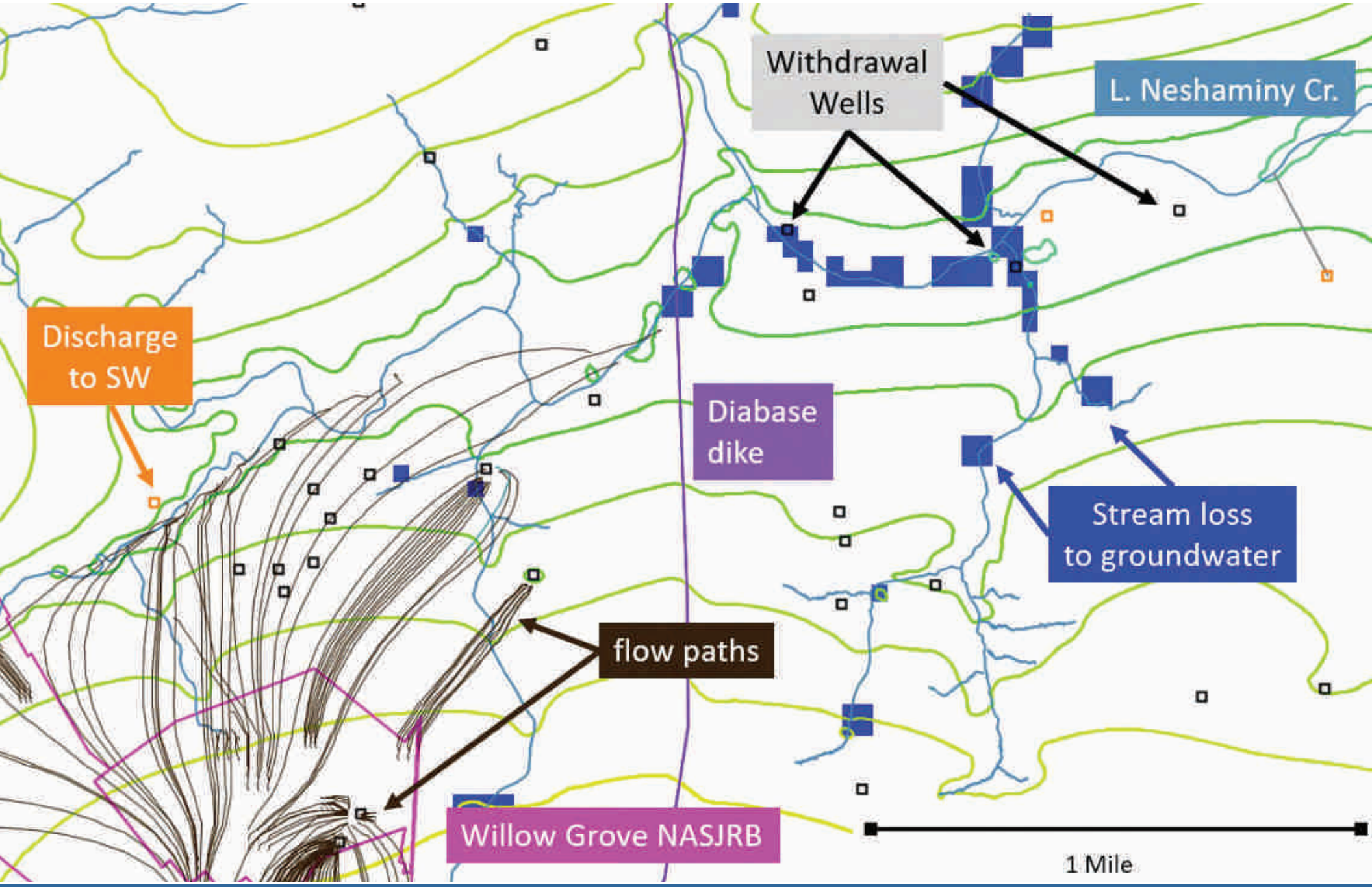


Simulated flow paths from sources, all scenarios (1999, 2010, 2013, 2016, 2017) and PFOA+PFOS levels in residential wells



USGS science for a changing world

Simulated groundwater flow paths and losing stream reaches, 2017 conditions



USGS science for a changing world

Simulated groundwater flow paths and losing stream reaches, 1999 conditions (more pumping than in 2017)

SUMMARY OF FINDINGS

"Simulations showed that recharge at the bases discharged to withdrawal wells and local streams, generally within a mile or two of the bases."

"Locations of many residential wells near the bases identified by the Navy and Air National Guard as having elevated PFAS concentrations are generally consistent with the simulated flow paths from possible sources at the bases."

"However, there are some areas of observed PFAS contamination where no flow paths from base sources were simulated, indicating presence of unknown PFAS sources, unidentified transport processes, and (or) model limitations."

Groundwater pumping results in depletion of base flow and, under some conditions, losing stream reaches, especially under reduced recharge conditions.

Reductions in pumping have reduced the proportion of recharge discharging to wells since the 1990s.

Uncertainty – regional scale model, limited data, transient flow conditions, etc.

POSSIBLE MODEL USES

Groundwater models are tools for synthesis of data and understanding, only one of "multiple lines of evidence" about groundwater flow

Model as tool for comparing alternative management actions

Current and possible uses of regional groundwater-flow model:

- Evaluate pumping effects on flow paths
- Describe likely areas of dissolved PFAS migration in groundwater under various hydrologic conditions (pumping, recharge)
- Set boundary conditions for higher resolution models to describe local-scale groundwater-flow system (remediation, capture area applications)
- Update or refine with new data, transient flow, etc.
- Identify data gaps and locate monitoring sites – groundwater, streams
- Hypothesis testing - e.g. Could a subsurface 'conduit' exist without being evident in measured groundwater levels?

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Next Steps

- Publish USGS Report (Approved December 4, 2019)

  Groundwater Withdrawals and Regional Flow Paths at and near Willow Grove and Warminster, Pennsylvania — Data Compilation and Preliminary Simulations for Conditions in 1999, 2010, 2013, 2016, and 2017

- Publish USGS Data Releases

  Model -- Can be re-run and modified

  Datasets

  Withdrawals

  Streamflow

- Available online after Publication

  @ usgs.gov

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U.S. EPA Update

Willow Grove Restoration Advisory Board (RAB) Meeting

December 4, 2019

Sarah Kloss, EPA Remedial Project Manager
U.S. EPA Region 3, Superfund Division

Agenda Overview

1. Superfund Federal Facility Cleanup Roles
2. USGS Model and the Superfund Cleanup
3. Implemented and Planned Short-term Actions

Superfund Federal Facility Cleanup Roles

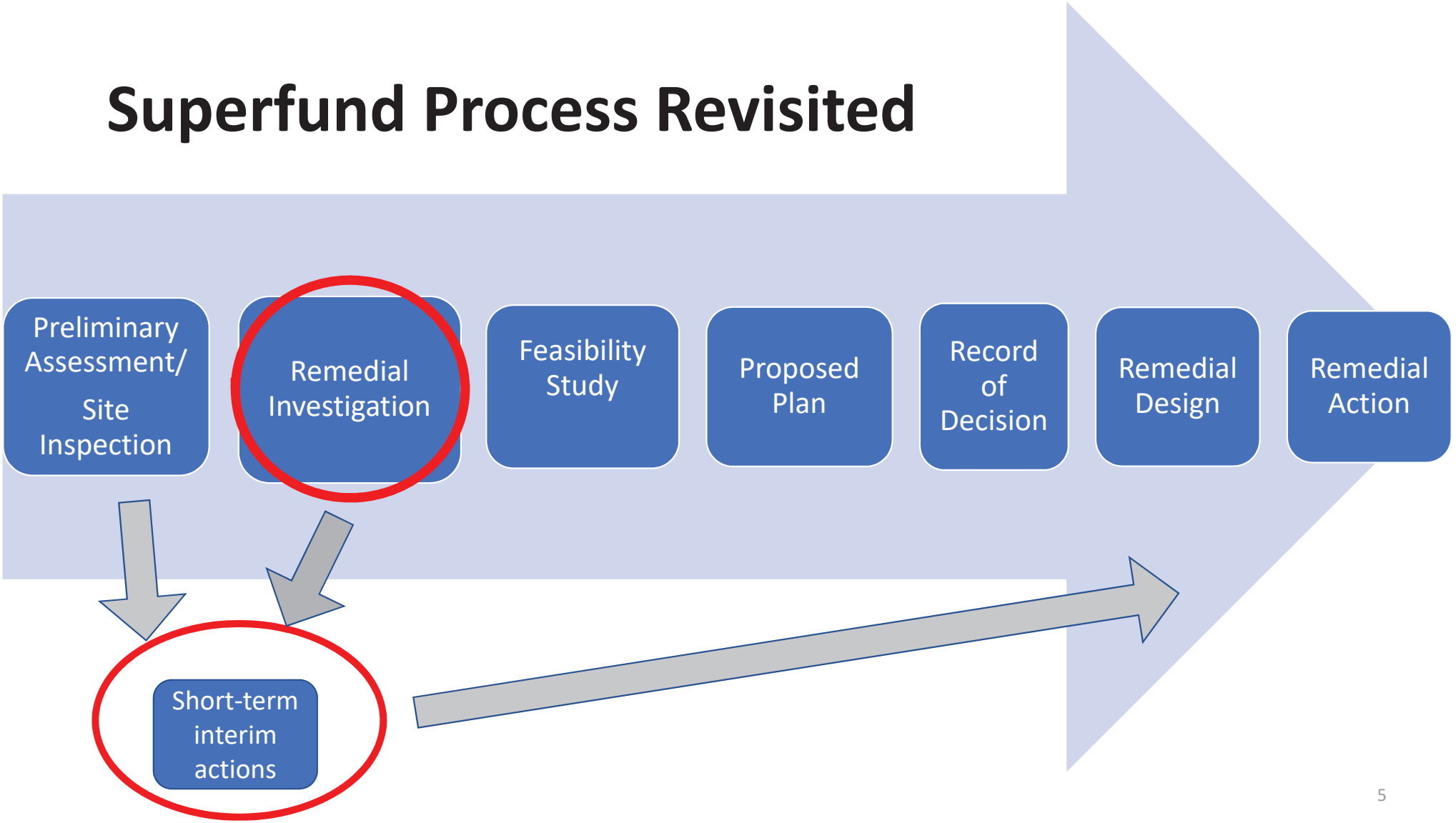
- Superfund uses a specific, multiphase process for implementing environmental cleanups
- Federal property owner is the “lead agency” for the cleanup
- EPA is the lead regulatory agency and provides oversight for the cleanup
- PADEP ensures that applicable state laws are followed

USGS Model and the Superfund Cleanup

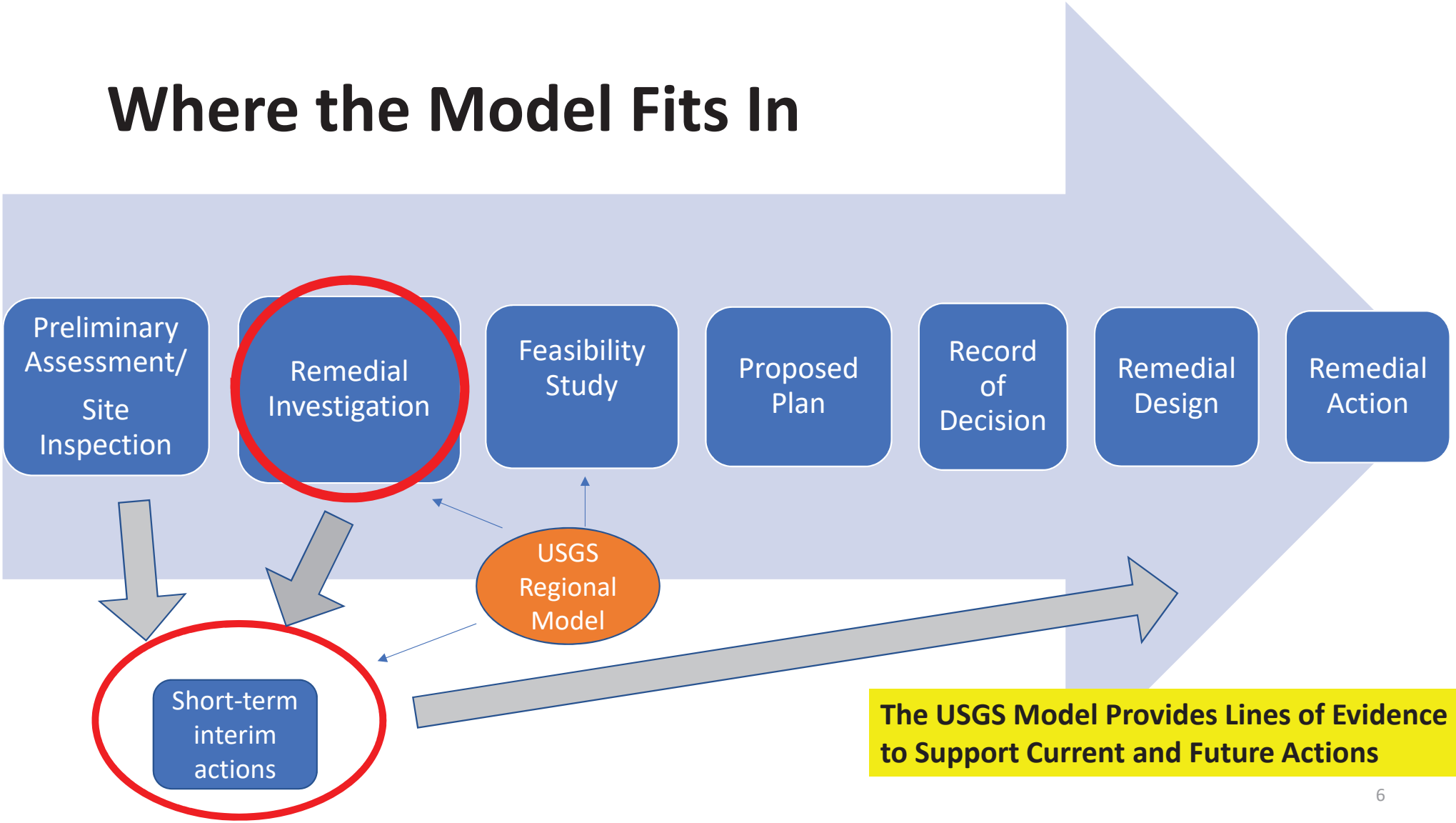
USGS Model Provides Lines of Evidence to:

- Understand the contaminant boundaries on a regional scale
- Support that the private well monitoring area is appropriate
- Continue stream monitoring
- Guide additional investigation

Superfund Process Revisited



Where the Model Fits In



The USGS Model Provides Lines of Evidence to Support Current and Future Actions

USGS Model Limitations

- Simplifies complex hydrogeology
- Limited by data availability
- Regional scale
  - Does not include localized pathways
  - Needs refinement (zoom in) to design a remedy
- Predicts groundwater flow, not specific contaminant concentrations
- Provides evidence to support assumptions, not definitive proof

Short-term Actions Implemented

- Eliminate current drinking water exposures
- Prevent contamination of additional drinking water sources
  - ✓Air National Guard installed treatment system to reduce PFAS entering Park Creek from stormwater basin
  - ✓Navy plugged stormwater outfalls and expanded on-site stormwater basins to minimize discharge to streams
  - ✓Navy excavated and disposed of the most highly contaminated soil that could be a source to groundwater
  - ✓Navy initiated groundwater pilot extraction and treatment of a source area
- Continuing to monitor surface water to ensure conditions are stable

Short-term Actions Planned

Navy

- Installing off-site wells to continue to monitor conditions and assess extent of groundwater contamination
- Pilot test extraction and treatment in the Fire Training Area
- Resampling private wells

Air National Guard

- Increasing capacity of the storm basin treatment system

Questions?

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