



# **Army National Guard**

## **Site Inspections (SIs) and Remedial Investigation (RI) under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**

**Camp Grayling Joint Maneuver Training Center, Michigan**

**1 August 2019**





# Community Health is the Top Priority

- Address potentially impacted areas of community drinking water
- Prepared to supply bottled water for exceedances over the EPA Lifetime Health Advisory Level (70 parts per trillion)
- Investigate presence and extent of per- and polyfluoralkyl substances (PFAS) at potential aqueous film forming foam (AFFF) release areas





# Who Is Involved?

- Michigan Army National Guard (State ARNG)
- ARNG (Federal) -Installation and Environment Directorate, Cleanup & Restoration
- US Army Corps of Engineers
- AECOM Technical Services, Inc. (Germantown, MD)

## Partners:

- Michigan Department of Environmental Quality, Remediation & Redevelopment Division (MDEQ)
- Michigan Department of Human and Health Services (MDHHS)
- District Health Department #10 (DHD #10)
- Michigan Department of Natural Resources (MDNR)
- Michigan PFAS Action Response Team (MPART)
- Restoration Advisory Board: Formal public venue for input into environmental remediation reviews





Camp Grayling Preliminary Assessment  
February 2018 – August 2018

Grayling Army Airfield Site Inspection  
October 2018

MATES/Range 30 Site Inspection  
October 2018

Cantonment Area Site Inspection  
May 2019

GAAF Time Critical Removal Action  
25 June 2019 – Public Meeting  
23 July 2019 – Consultation Meeting  
30 July 2019 – Action Memo Signed

MATES/Range 30 Drinking Water Testing  
November/December 2018

Restoration Advisory Board Established  
Informational Meeting – 5 June 19  
Initial Meeting – 31 July 19

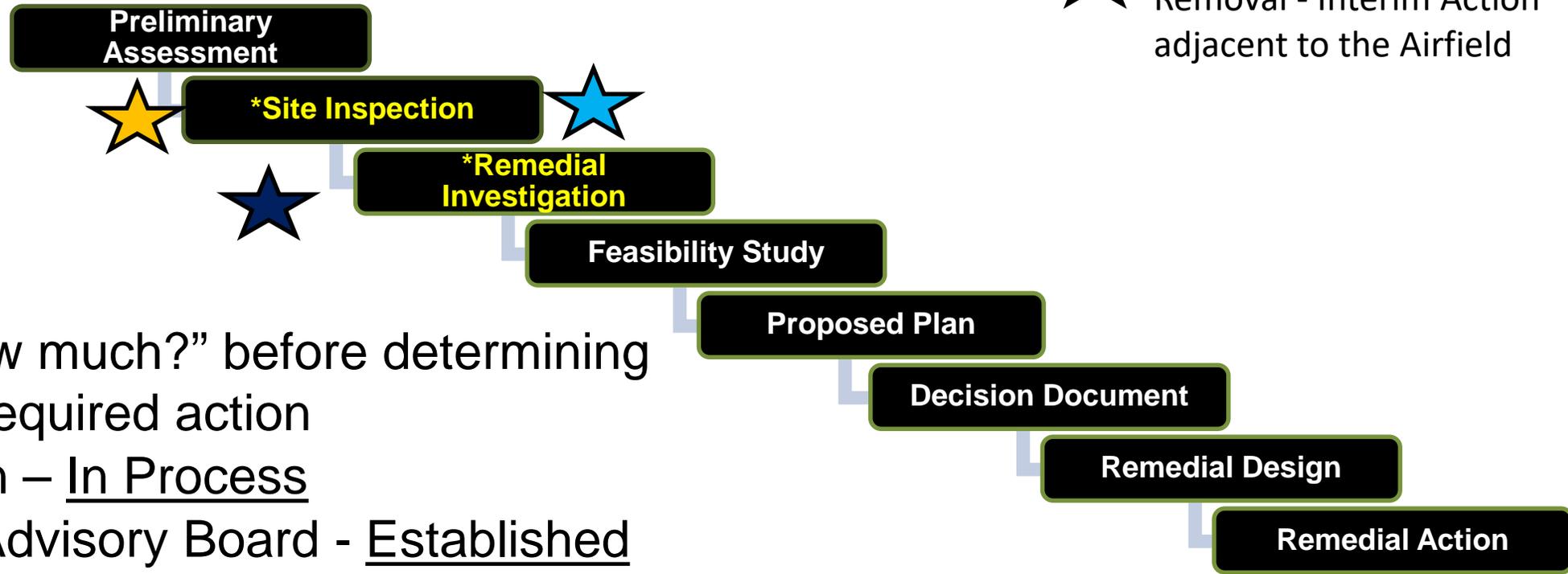




# ARNG Committed to Immediate and Transparent PFAS Investigations

- ★ MATES/Range 30
- ★ Cantonment Area / Lake Margrethe
- ★ Grayling Airfield

★ TCRA=Time Critical Removal - Interim Action adjacent to the Airfield



- “Where & how much?” before determining appropriate required action
- Interim Action – In Process
- Restoration Advisory Board - Established
- Administrative Record – at local library



CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act



# Grayling Army Airfield- Time Critical Removal Action (TCRA)

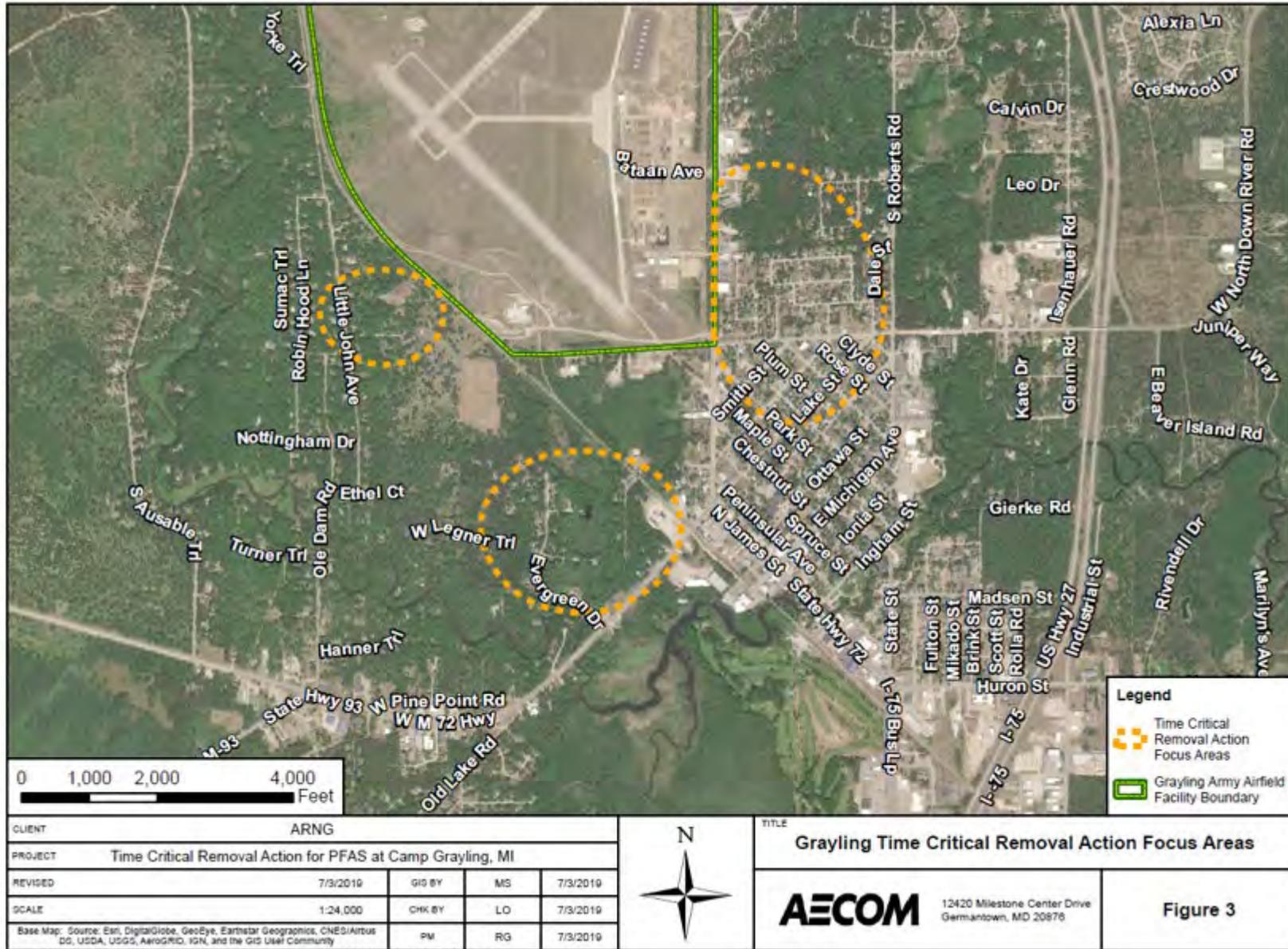
- What is a Time Critical Removal Action for PFAS?
  - Removes risk to human drinking water consumption (~6 months)
  - Can be bottled water as an interim measure
  - Can be a more durable drinking water solution
- Bottled Water as interim for wells over 70 PPT adjacent to Airfield (17 wells)
- Retesting wells with values between 40 and 70 PPT adjacent to the Airfield (9 wells)





# Time Critical Removal Action

Figure 3: Grayling TCRA Focus Areas





# Grayling Army Airfield- Time Critical Action cont'd

- Three Durable Alternatives Evaluated

- 1) 17 wells - Connection to City of Grayling municipal water supply

- 2) Installation of residential deep wells

3) Construction of Grayling Township municipal water supply and distribution system (14 connected to new TWP system / 3 wells to existing city system)

- Criteria:

- Safety & Effectiveness
- Implementability
- Available Funding





# Grayling Army Airfield- Time Critical Action cont'd

- 1) Connection to City of Grayling municipal water supply
  - Safe & Effective (AECOM)
  - **Not Implementable - Insufficient capacity to meet current & future requirements (City of Grayling)**
  - Available Funding (NGB)
  
- 2) Installation of residential deep wells
  - **Neither Safe nor Effective (AECOM, NGB, City of Grayling)**
  - Implementable (AECOM)
  - Available Funding (NGB)





# Grayling Army Airfield- Time Critical Action cont'd

3) Construction of Grayling Township municipal water supply and distribution system

- Safe & Effective (AECOM)
- Implementable (City of Grayling/Township of Grayling)
- Available Funding (NGB)

The decision was collectively (NGB, MIARNG/DMVA, City of Grayling, Township of Grayling) that the funding risk was the most acceptable. NGB is working to find additional funding.





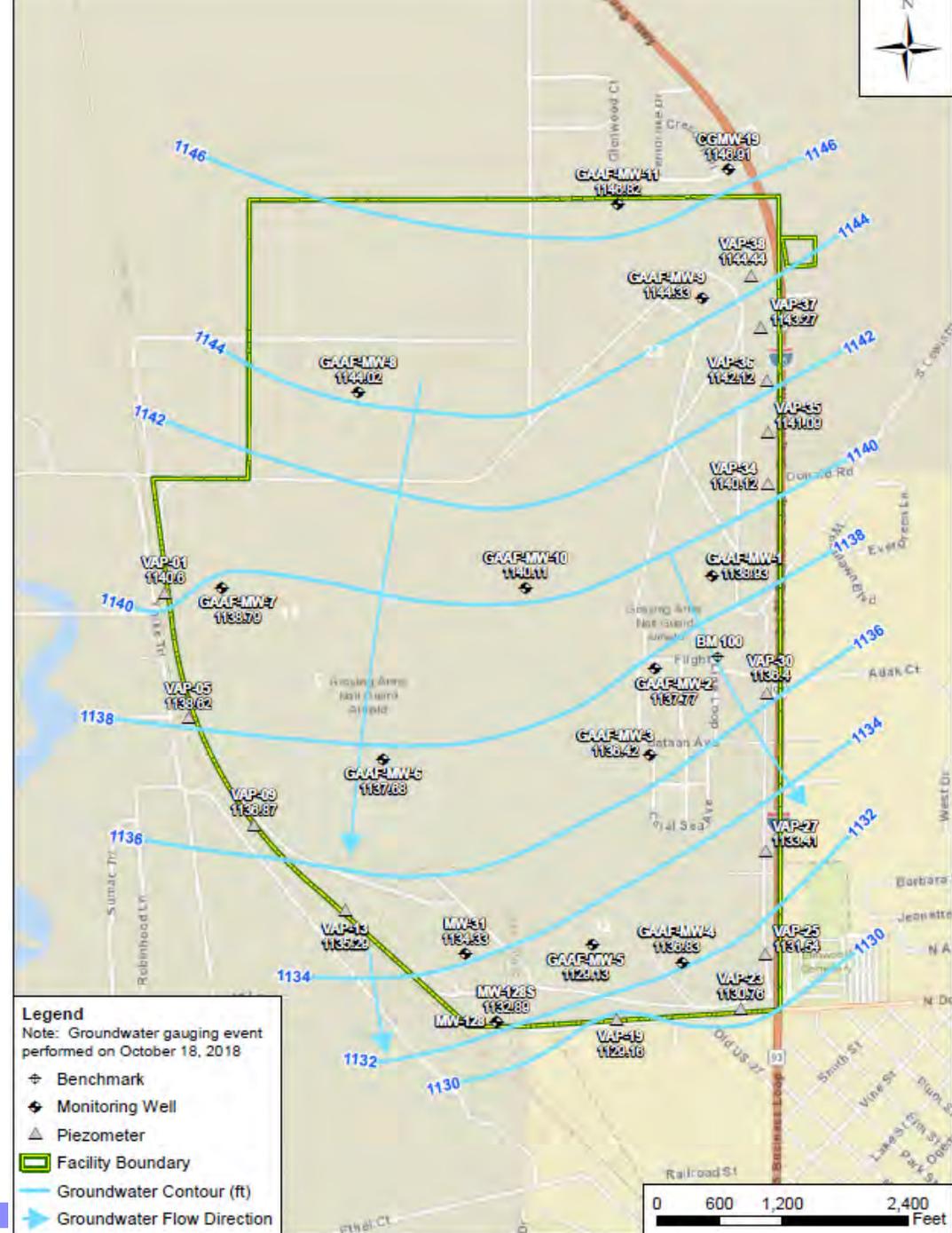
# Site Inspections

- Presence or absence at each potential release area
  - (1) Grayling Army Airfield (GAAF)
  - (2) Maneuver Area Training Equipment Site (MATES) / Range 30
  - (3) Cantonment Area and Lake Margrethe (no data yet)
- Gather groundwater flow data
- Check for alternate sources
- Check installation boundary concentrations
- Sample homeowner drinking water if off-installation release suspected



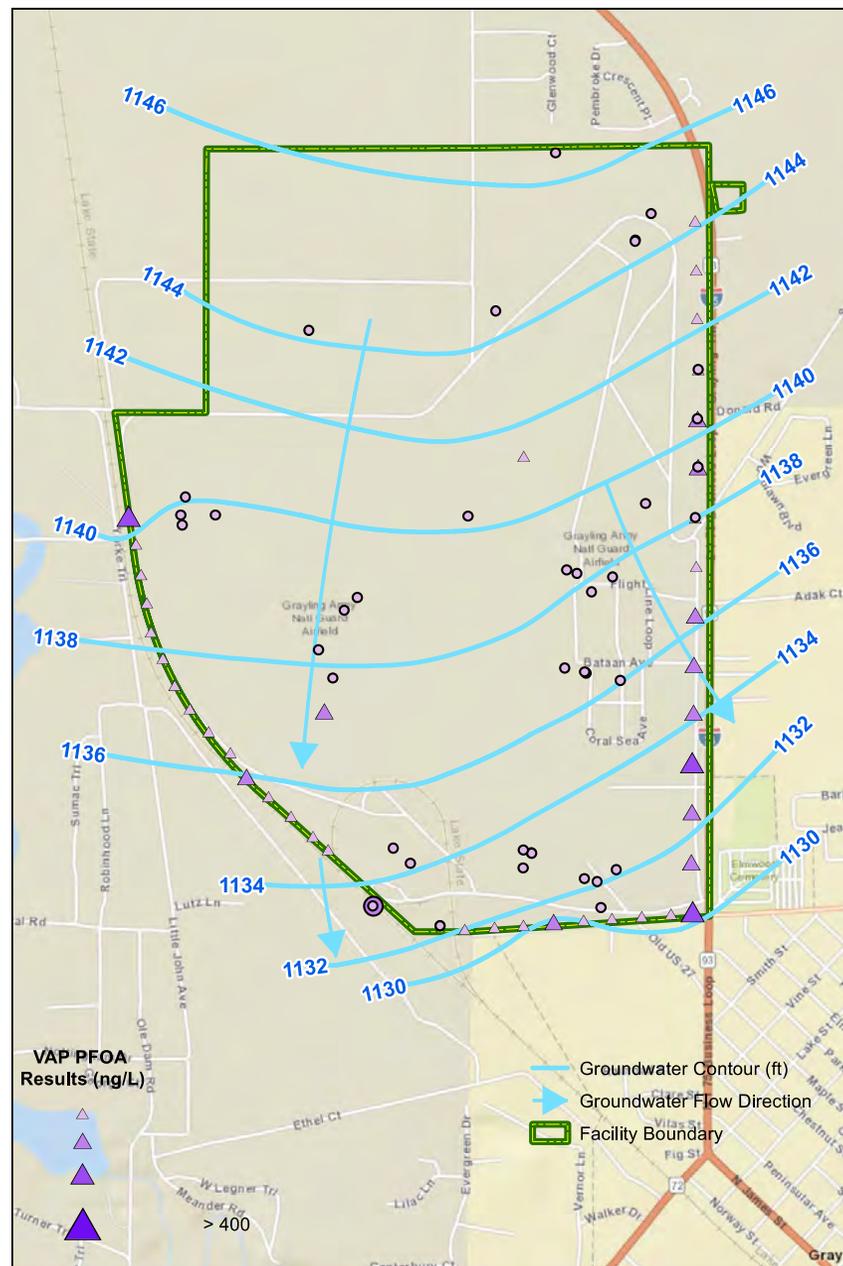


# Grayling Army Airfield Site Inspection Findings to Date



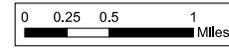
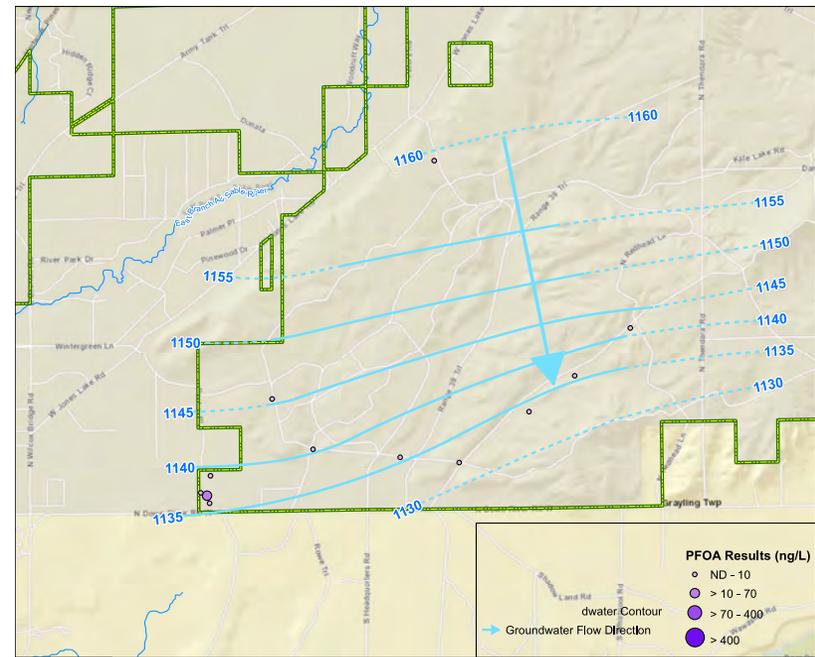


# Grayling Army Airfield Site Inspection Findings



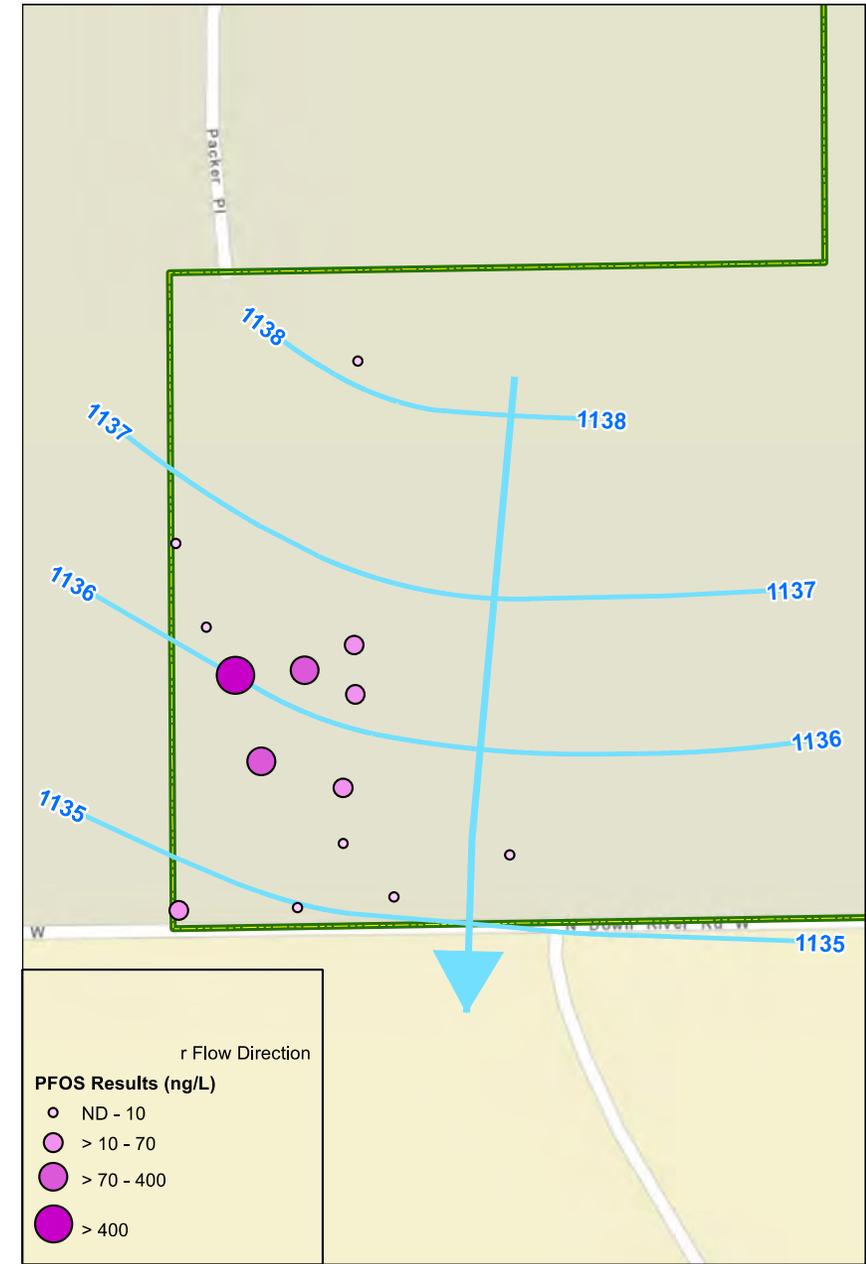


# MATES / Range 30 Site Inspection Findings



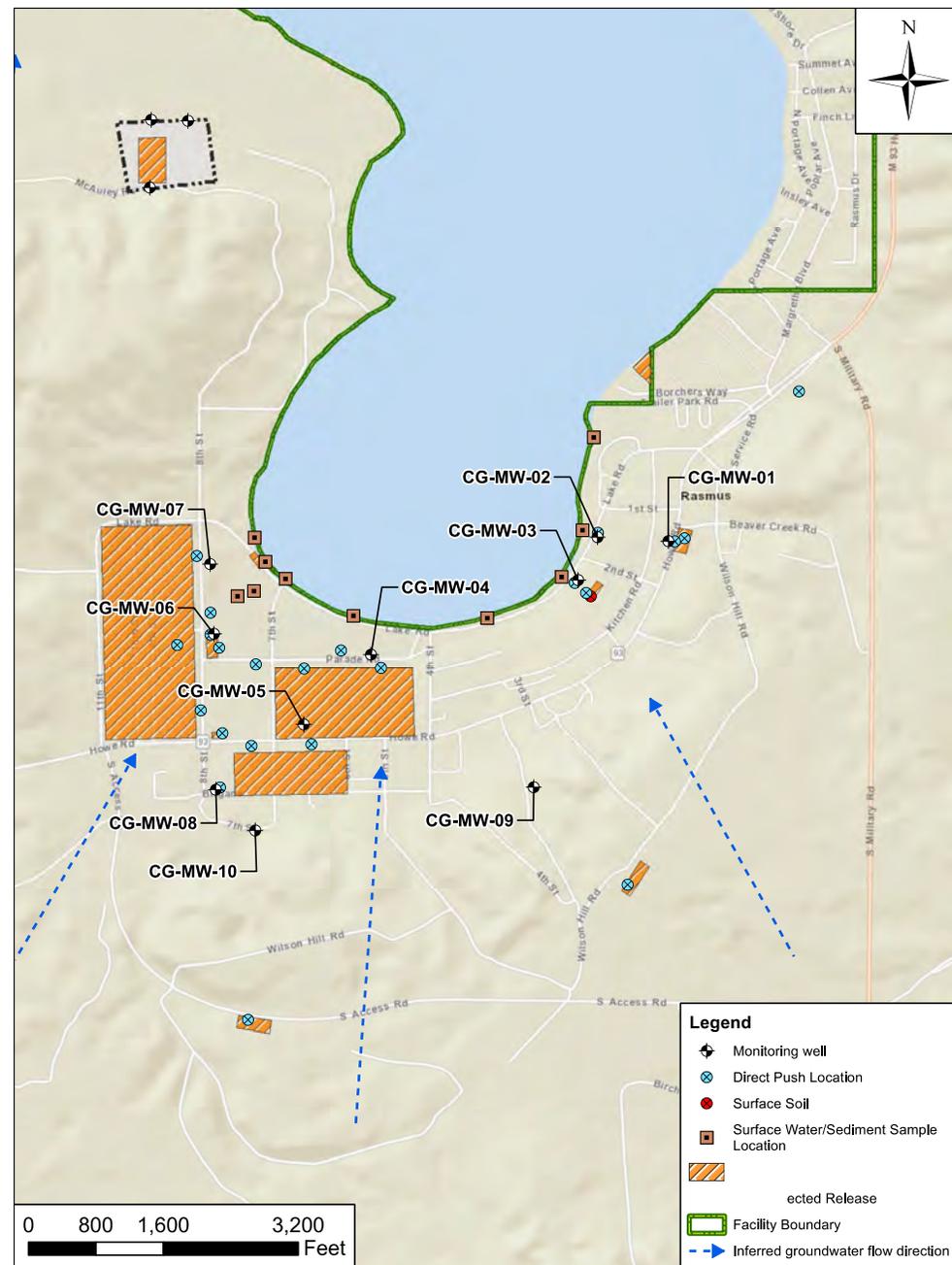


# MATES / Range 30 Site Inspection Findings





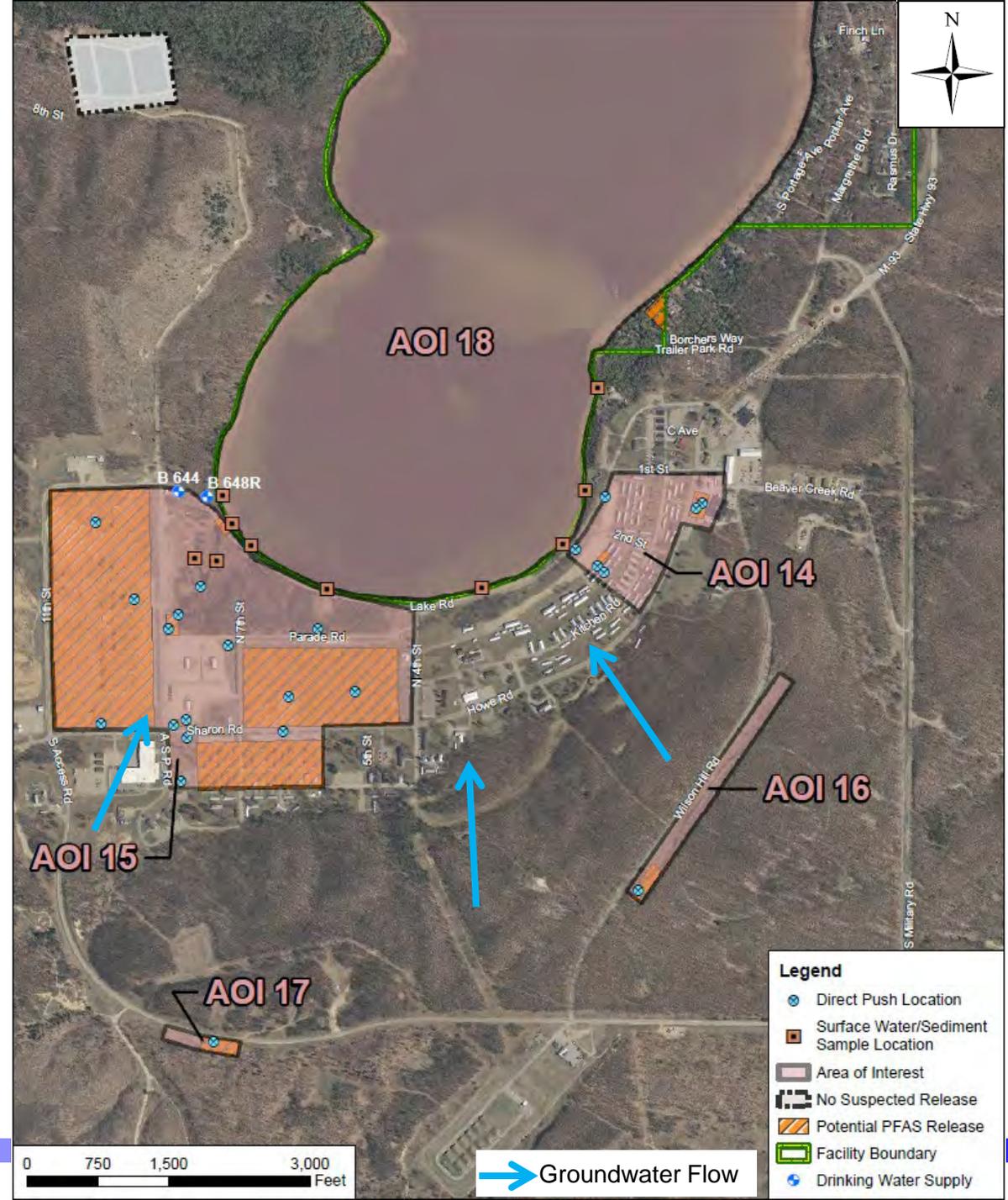
# Cantonment Area and Lake Margrethe Site Inspection Sampling





# Cantonment Area and Lake Margrethe Site Inspection Sampling

Sample Count	Ground-water	Soil	Surface Water	Sediment
<b>Total</b>	26	69	10	10



- Legend**
- Direct Push Location
  - Surface Water/Sediment Sample Location
  - Area of Interest
  - No Suspected Release
  - Potential PFAS Release
  - Facility Boundary
  - Drinking Water Supply

➔ Groundwater Flow



# Next Steps - \*\*\*\*Current Public Meeting: 1 August 2019\*\*\*\*\*

## CERCLA – SI/RI Activities

- Fall 2019 Begin GAAF Remedial Investigation / Risk Assessment
- Fall 2019/ Winter 2020 Cantonment Area and Lake Margrethe Site Inspection Results

## TCRA TIMELINE

- MIARNG Contract needed by Late August 2019
- Summer 2019 Test drinking water (40-69 ppt) adjacent to GAAF
- FALL 2019 City of Grayling Hookups
- Winter 2020 Design New System
- Summer/Fall 2020 begin Installation of new township system





# Contacts

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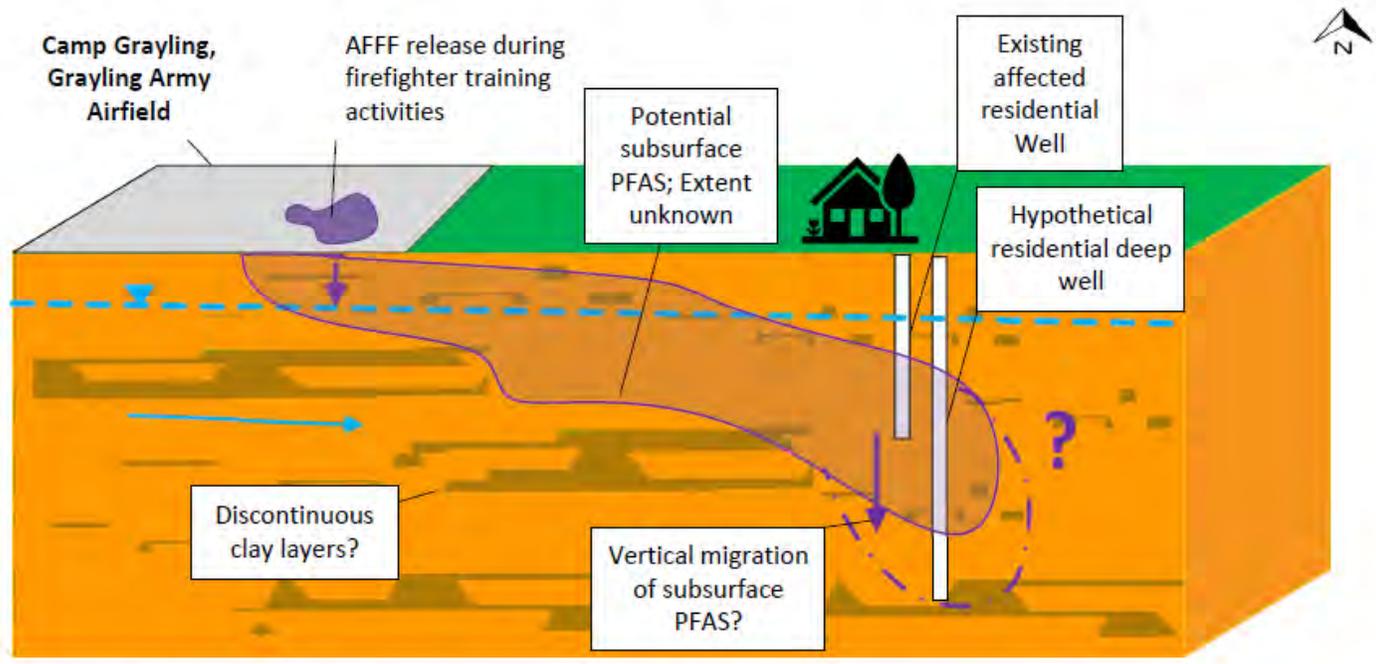
BACKUP SLIDES





# TCRA: PFAS plume complexity- depth

## Hypothetical Scenario



- Clay/ Silt
- Sand/ Gravel
- Groundwater Elevation
- Groundwater Flow Direction
- Possible Subsurface PFAS Migration

SCHEMATIC / NOT TO SCALE





# Actions Taken to Date

- Feb 2018 Camp Grayling Preliminary Assessment site visit
- Mar 2018 GAAF Site Inspection begins
- Aug 2018 Final Preliminary Assessment Report
- Sep-Oct 2018 GAAF SI field work completed
- Oct 2018 MATES/Range 30 SI field work completed
- Oct 2018 GAAF Remedial Investigation awarded
- Nov-Dec 2018 Drinking Water Sampling near MATES/Range 30
- May 2019 Cantonment Area Site Inspection Field work completed
- 5 June 2019 RAB informational meeting
- 25 June 2019 Time Critical Removal Action meeting
- 23 July 2019 Follow-up Time Critical Removal Action meeting
- 30 July 2019 Time Critical Removal Action Memo signed
- 31 July 2019 RAB initial meeting



# Grayling Area PFAS

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August 1, 2019

# Drinking Water Sampling Status

Total Samples	Results Pending	Non-Detects	Detections Below Criteria*	Detections Above Criteria*
694	1	458	218	17

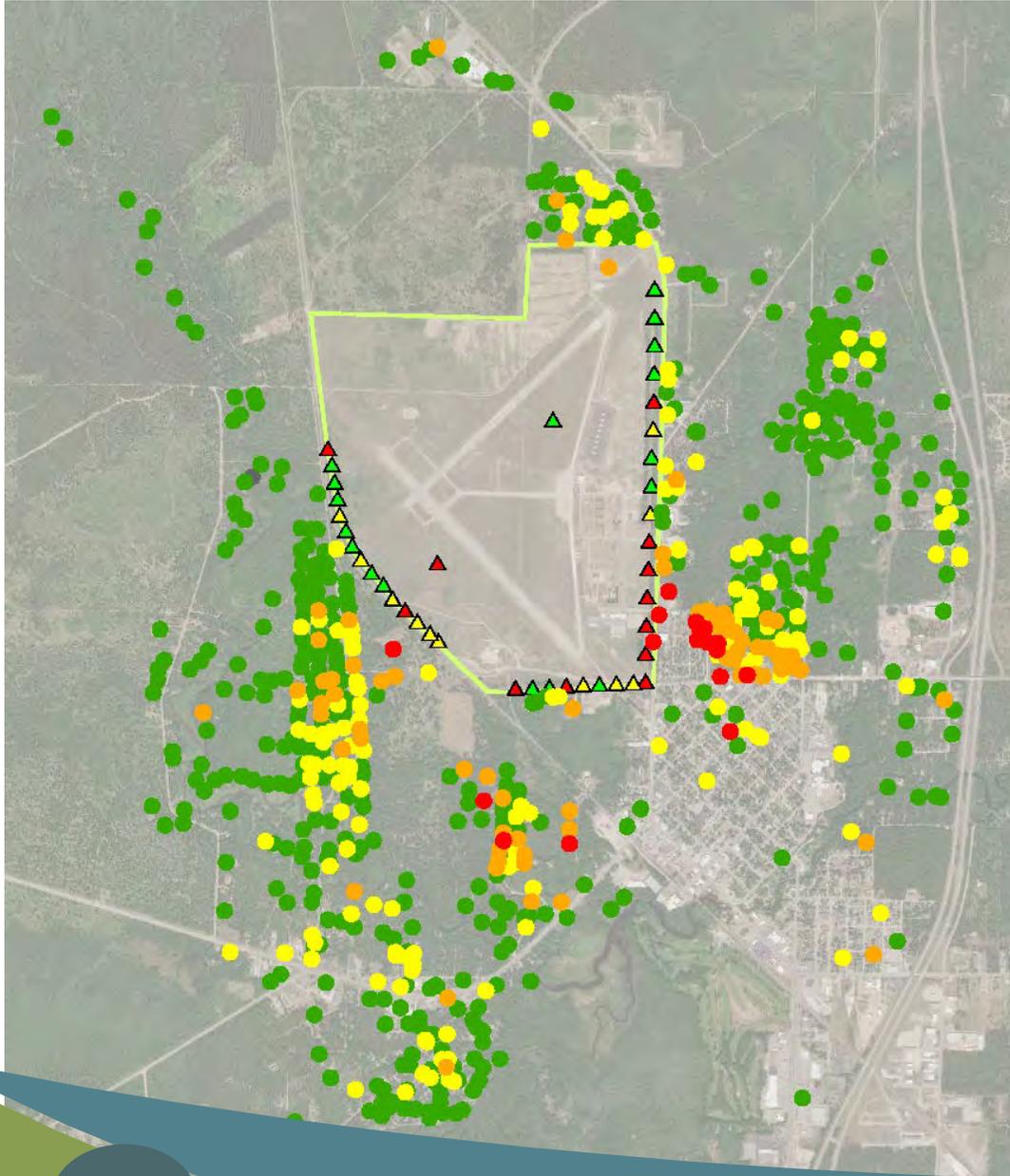
**\*Criteria:  
PFOA + PFOS > 70 ppt**

# Drinking Water Sampling Status – Samples Since December, 2018

Total Samples	Results Pending	Non-Detects	Detections Below Criteria*	Detections Above Criteria*
17	1	13	3	0

**\*Criteria:  
PFOA + PFOS > 70 ppt**

# Residential Drinking Water Heat Map (PFOA+PFOS)



## Legend

### Drinking Water Sample Locations PFOA+PFOS (694 Samples)

- Results Pending
- Non-Detect (458)
- >0 to 10 ppt (147)
- >10 to 70 ppt (71)
- >70 ppt (17)

### Previous VAS Sampling Locations

- ▲ Non-Detect
- ▲ >0 to 70 ppt
- ▲ >70 ppt

□ Grayling Airfield Boundary

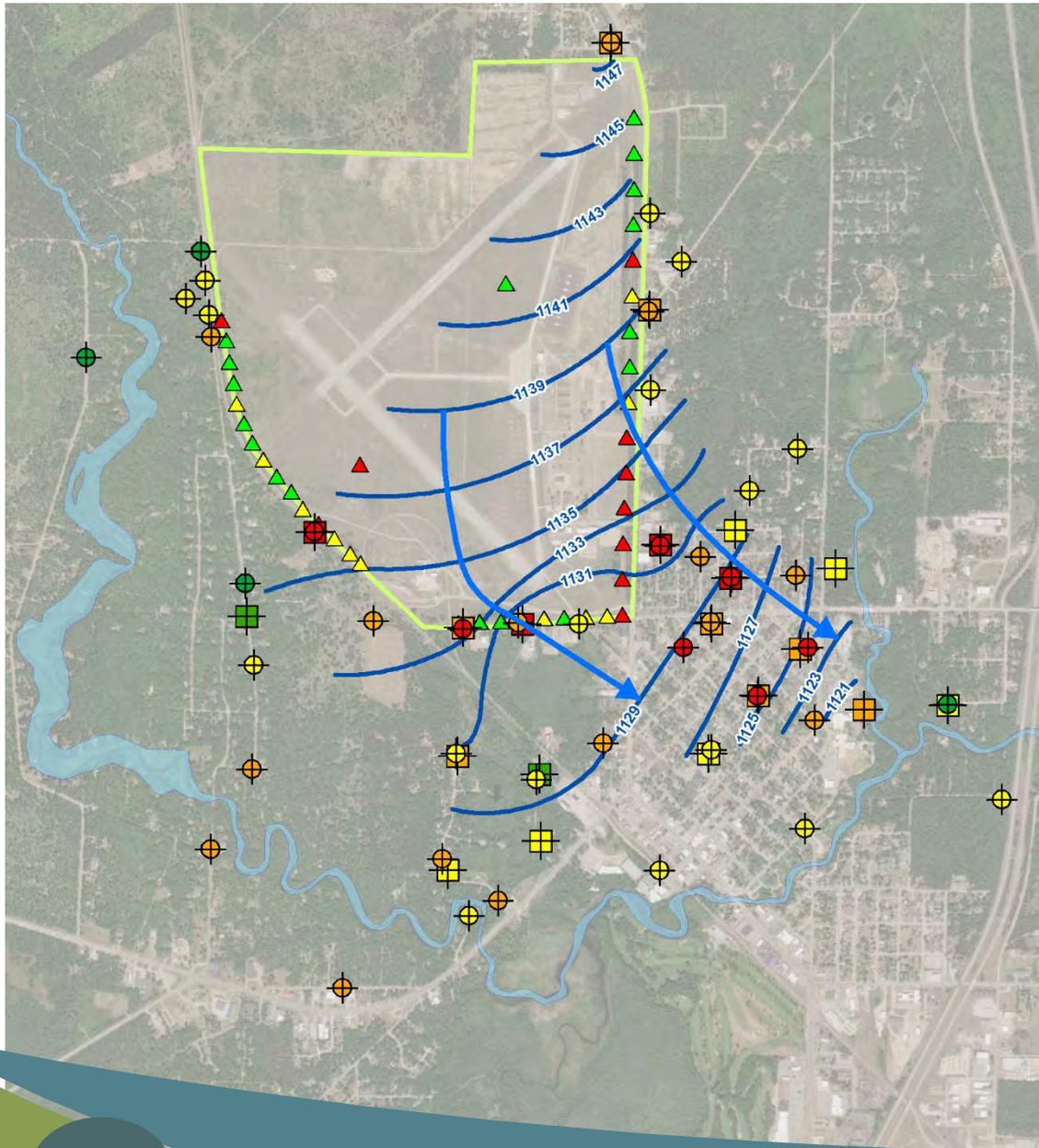
## Au Sable Surface Water/Pore Water Sampling

- EGLE collected pore and surface water samples from 23 locations on July 8<sup>th</sup> and 9<sup>th</sup>
- Springs found with thermometers
- 12 locations between Ole Dam Rd and M-72
- 11 locations between I-75 Business Loop and confluence of East and Main Branch Au Sable
- Results pending



- Completed two quarterly groundwater sampling events of monitoring wells:
  - February 2019
  - May 2019

# Remedial Investigation Update



## Legend

### VAS Sample Locations PFOA+PFOS

- ⊕ Non-Detect
- ⊕ >0 to 10 ppt
- ⊕ >10 to 70 ppt
- ⊕ >70 ppt

### Permanent Monitoring Well Locations

#### PFOA+PFOS

- ⊞ Non-Detect
- ⊞ >0 to 10 ppt
- ⊞ >10 to 70 ppt
- ⊞ >70 to 1,000 ppt

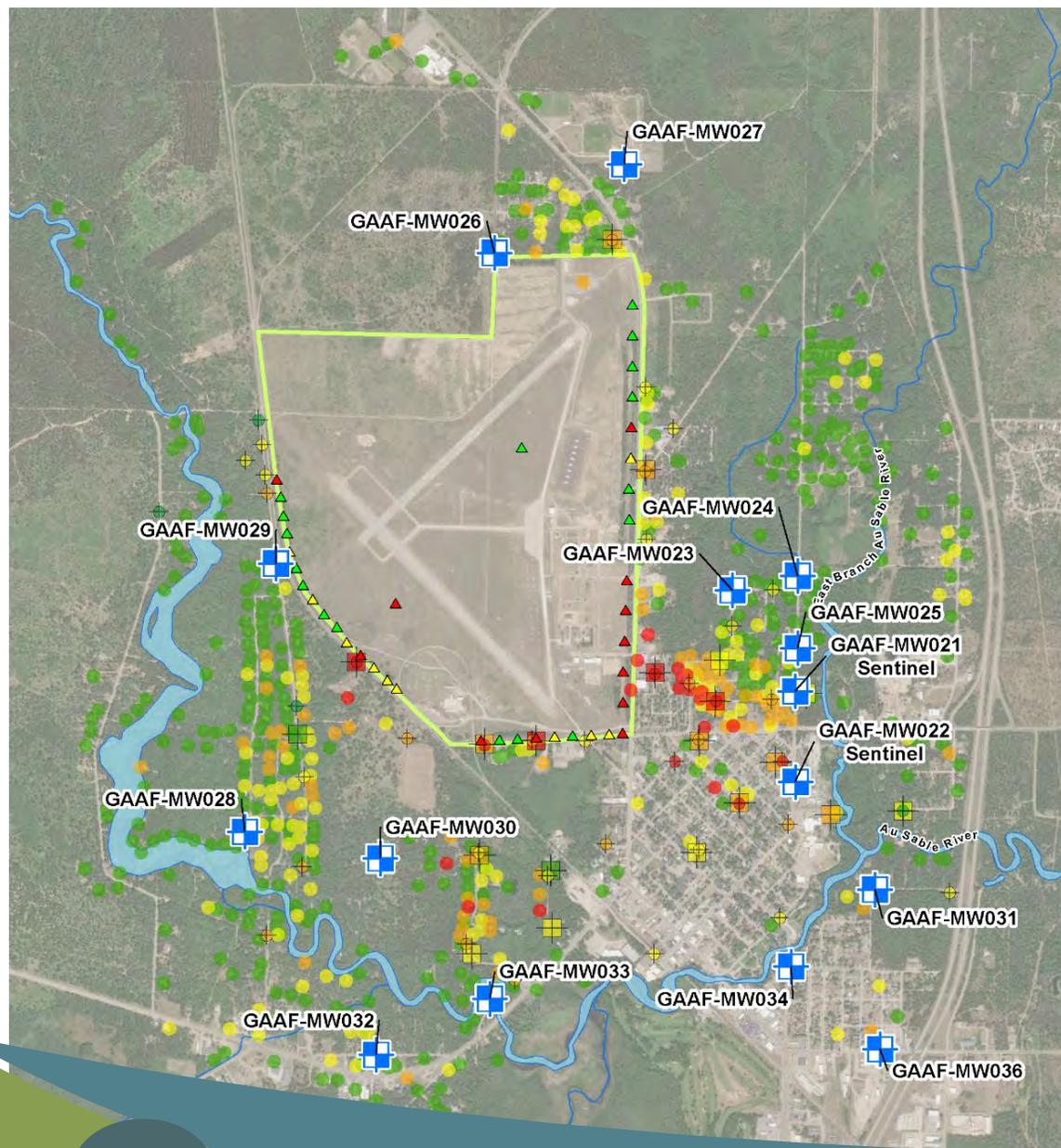
— Groundwater Contour (2-ft interval)

### ➤ Residential Drinking Water Sampling

- Continuing to schedule residents that request sampling in Sampling Area.

### ➤ Remedial Investigation

- Continue quarterly groundwater sampling of monitoring wells.
  - Next sampling event, August 2019.
- Coordinate data exchange with Army Guard.
- Remedial Investigation Phase III, Anticipated start, Fall 2019.



## Proposed Phase III Monitoring Wells

- 14 additional nested monitoring wells to further delineate impacted groundwater.
- Nested monitoring wells up groundwater gradient of City of Grayling Municipal supply wells.

## Legend

■ Phase III Monitoring Well Locations

□ Grayling Airfield Boundary

# Camp Grayling – Lake Margrethe PFAS Investigation

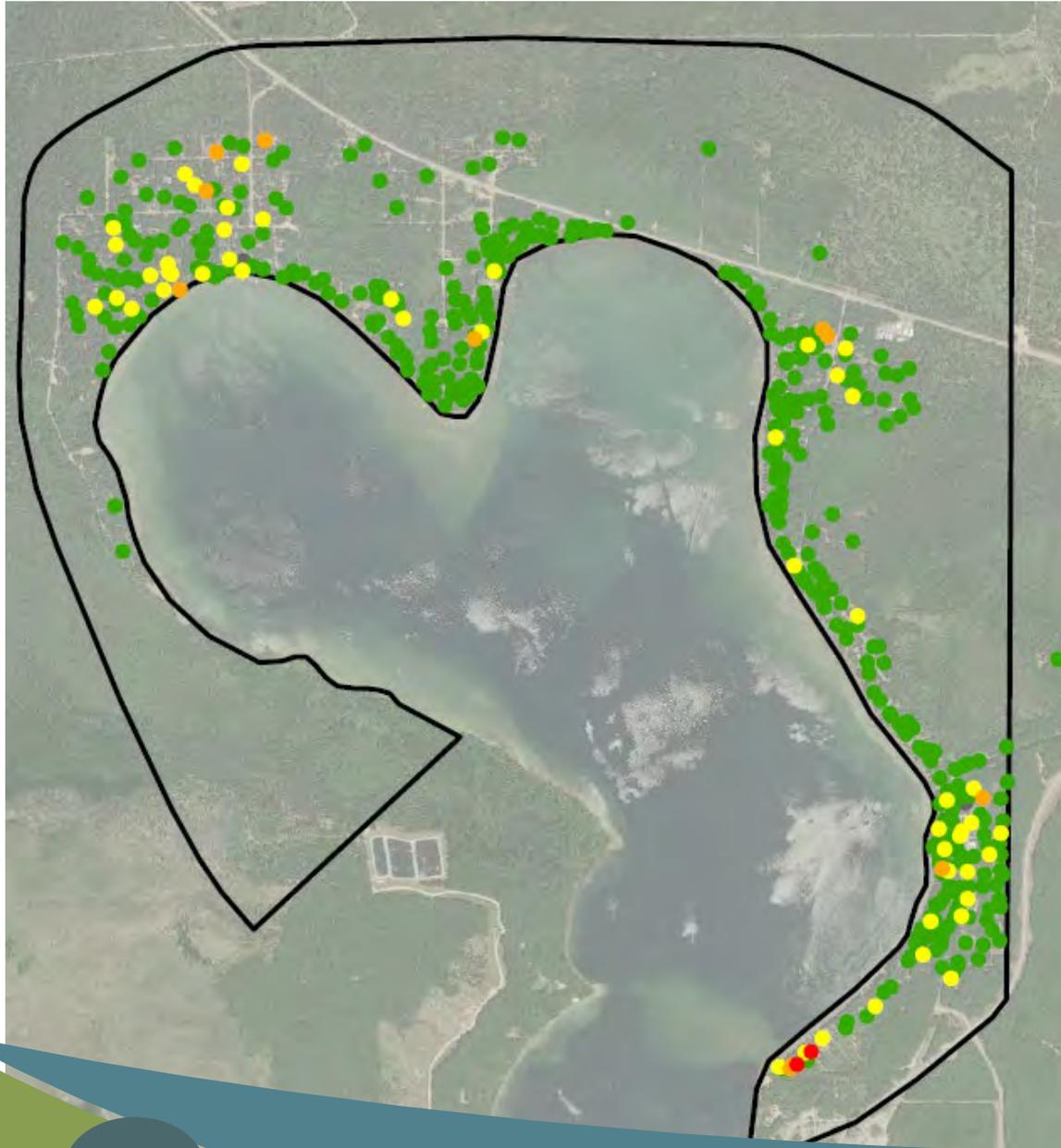
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August 1, 2019

# Residential Well Samples

Type of Sample	Criteria	Total Number of Samples	Number of Non-Detects	Number of Detections Below Criteria	Number of Detections Above Criteria
Drinking Water Well	PFOA + PFOS > 70 ppt	463	400	61	2

# Residential Drinking Water Heat Map – PFOA + PFOS



## Legend

### Drinking Water Sample Locations PFOA + PFOS (447 Samples)

- Non-Detect (384)
- >0 to 10 ppt (50)
- >10 to 70 ppt (11)
- >70 ppt (2)

□ Lake Margrethe Sampling Area



- Quarterly Monitoring
  - 5 permanent monitoring wells sampled quarterly
  - Total of 14 samples collected per event
  - 1<sup>st</sup> Quarterly Event: February 2019
  - 2<sup>nd</sup> Quarterly Event: May 2019

**Legend**

**Permanent Monitoring Well Locations**

**PFOA+PFOS**

- Non-Detect
- >0 to 10 ppt
- >10 to 70 ppt
- >70 ppt

— Groundwater Contour (2-ft interval)

□ Lake Margrethe Sampling Area

## Foam and Surface Water Sampling



### ➤ Foam

- One new foam sample collected in 2019
- PFOS: 719 – 30,400 ppt
- PFOA: 0 – 165 ppt
- Total PFAS: 1,580 – 41,328 ppt

### Legend

#### **Total PFAS (ppt)**

- >0 to 10,000
- >10,000 to 20,000 ppt
- >20,000 to 30,000 ppt
- >30,000 to 40,000 ppt
- >40,000 ppt

## Pore Water and Surface Water Samples – June 2019

Type of Sample	Criteria	Total Number of Samples	Number of Non-Detects	Number of Detections Below Criteria	Number of Detections Above Criteria
Pore Water	PFOS > 12 ppt	12	10	0	2
Surface Water	PFOS > 12 ppt	13	6	7	0

## Pore Water and Surface Water Sampling



### ➤ Pore Water

➤ PFOS: 0 – 77.5 ppt

➤ Total PFAS: 0 – 216.7 ppt

### ➤ Surface Water

➤ PFOS: 0 – 8.9 ppt

➤ Total PFAS: 0 – 26.0 ppt

### Legend

● Pore Water Sample Location

▲ Surface Water Sample Location

□ Lake Margrethe Sampling Area

# Groundwater Seep Investigation



### ➤ Residential Drinking Water Sampling

- Continuing to schedule residents that request sampling in Sample Area.
- Continue to collect foam samples from Lake Margrethe in new areas.

### ➤ Remedial Investigation

- Continue Quarterly Groundwater sampling of monitoring wells.
  - Next Sampling event, August - September 2019.
- Coordinate data exchange with Army Guard.
- Remedial Investigation Phase II, Anticipated start, Fall 2019.

## Proposed Phase II Remedial Investigation



### Proposed Phase II Monitoring Wells

- 5 additional nested monitoring wells to further delineate impacted groundwater.
- 4 wells proposed on Camp Grayling property.

### Legend

- ▲ Phase II Monitoring Well Locations

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# Jonathan Edgerly

Environmental Manager Michigan Army  
National Guard



- Restoration Advisory Board
- Plumestop Pilot Study
- Strategic Environmental Research and Development Program-  
DoD/DoE/EPA
  - ✓ Mobile Lab

# What is a RAB?



- A Restoration Advisory Board (RAB) is a local stakeholder group
- Meets regularly
- Share information and 2 way communication
- Specific to a DoD property
- Camp Grayling Restoration Advisory Board:  
Established July 2019

# What is the purpose of a RAB?



- Offers members the opportunity to influence cleanup decisions through discussion and to provide input to decision makers.
- Offers members and the public the opportunity to share their questions, concerns, and ideas with environmental / health agencies involved in the restoration.
- Offers a focused and interactive opportunity to participate in the restoration process.

# Participants



- Camp Grayling Commanding Officer – COL Ed Hallenbeck**
- Camp Grayling Co- chair – Jonathan Edgerly - MIARNG**
- Community Co- chair – TBD (Election AUG2019)**
- Community RAB Members**
- Local & State Environmental / Health Oversight Agencies**
- Public**

# RAB Community Members

- Provide advice and comment on restoration issues to the decision makers.
- Represent and communicate community interests and concerns to RAB.
- Act as a conduit for the exchange of information between the community, Camp Grayling, and State/Local environmental/health agencies regarding restoration activities.
- Review, evaluate, and comment on documents/materials related to restoration activities..



# General Public



- Participate in community RAB meetings.
- Follow RAB rules & procedures when at meetings or interacting with RAB members.
- Ask questions to ensure understanding of RAB activities & impact on the community.
- RAB meetings are open to the public**

# Plumestop – Pilot Study

## Colloidal Activated Carbon



- Very small particles- Size of a red blood cell
- Suspended in water/food grade polymer
- Converts polluted aquifer into purifying filter



# Field Test Location



Former Bulk Storage Tanks Location



# Simple Plume Cut-Off Barrier



# Validation of Streamlined Mobile Lab-Based Real Time PFAS Analytical Methods



<https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Emerging-Issues/ER19-5203/>

# Validation of Streamlined Mobile Lab-Based Real Time PFAS Analytical Methods



- Fall 2019
- The objective of this project is to demonstrate the utility of a mobile lab
- Near real-time analysis
- Expedite Remedial Investigation

# Michigan Army National Guard PFAS Points of Contact



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# Per and Polyfluorinated Alkyl Substances (PFAS)

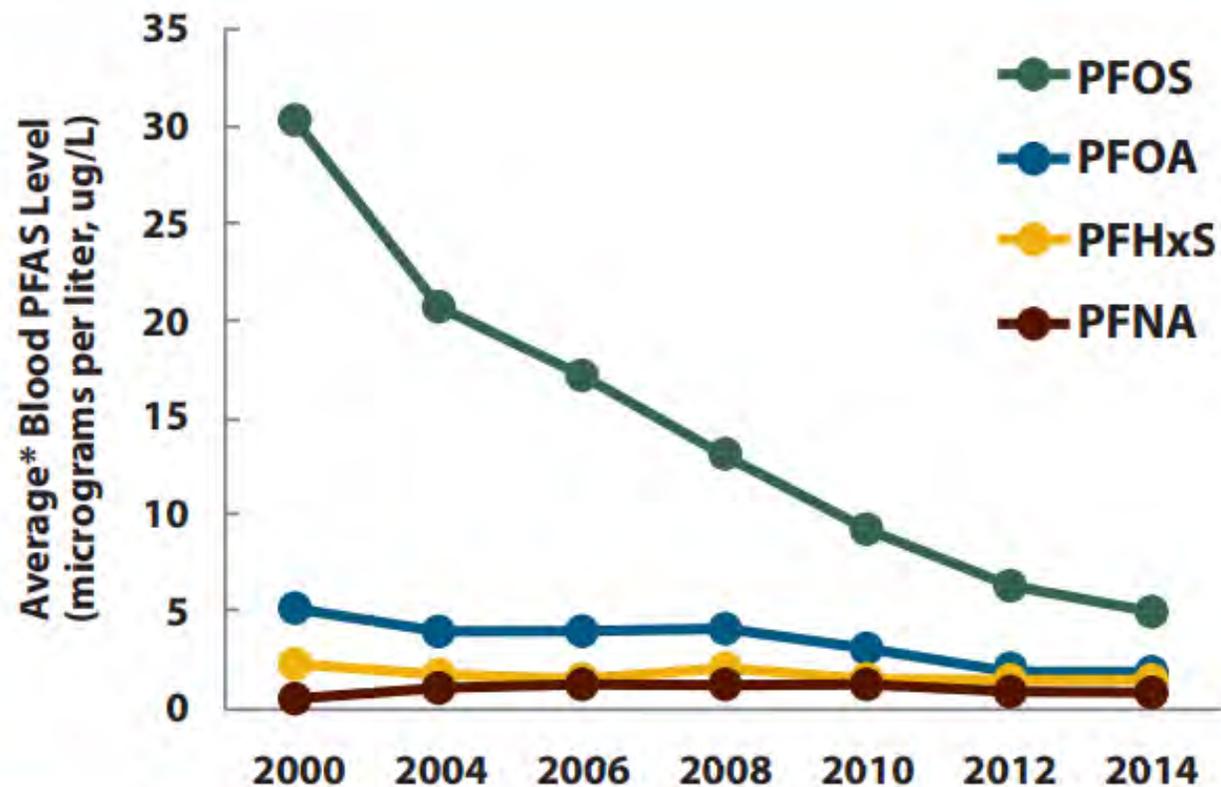
Sesha Kallakuri

Michigan Department of Health and Human Services

August 1, 2019

# PFAS Sources





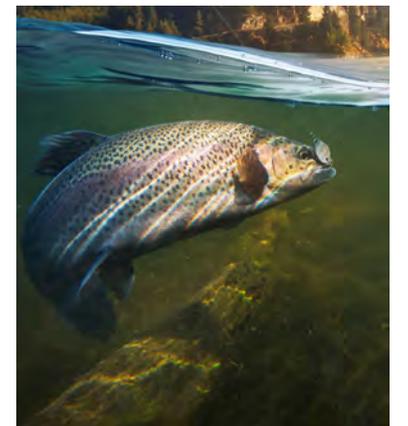
\* Average = geometric mean

**Data Source:** Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

**Blood Levels of  
the Most  
Common PFAS  
in People in the  
U.S. from  
2000-2014**

# Exposure to PFAS Chemicals

- Drinking contaminated water
- Eating fish caught from water contaminated by PFAS
  - “Do Not Eat Fish” Advisories
- Incidentally swallowing contaminated soil or dust
- Eating food packaged in materials containing PFAS
- Using some consumer products (i.e. non-stick cookware, treated fabrics)
- PFAS absorption through skin is negligible



# Potential Associated Health Outcomes – PFOA and/or PFOS

## Humans

- Lowering a woman's chance of getting pregnant
- Increasing the chance of high blood pressure in pregnant women
- Increasing the chance of thyroid disease\*
- Increasing cholesterol levels
- Changing immune response
- Increasing chance of cancer, especially kidney and testicular cancers

## Animals

- Developmental effects
- Reproductive effects
- Liver effects
- Endocrine effects (thyroid)
- Immune effects
- Tumors (liver, testicular\*, pancreatic)

\* PFOA only

# Lifetime Health Advisory

- The LHA is currently 70 parts per trillion (ppt)\* for PFOA and PFOS combined in drinking water.
- The EPA currently considers the LHA to be health protective for everyone (including children and pregnant women) over their lifetime.

\***NOTE:** 1 ppt = 1 ng/L (nanograms per liter)

# MDHHS Public Health Drinking Water Screening Levels for PFAS

PFAS Chemical	Screening Level
PFOA	9 ppt (parts per trillion)
PFOS	8 ppt
PFHxS	84 ppt
PFNA	9 ppt
PFBS	1000 ppt

# Interim Alternate Water

Site Name	Result Letters Mailed	Filters Distributed
Grayling Army Airfield (GAAF)	823	325
Lake Margrethe	532	132

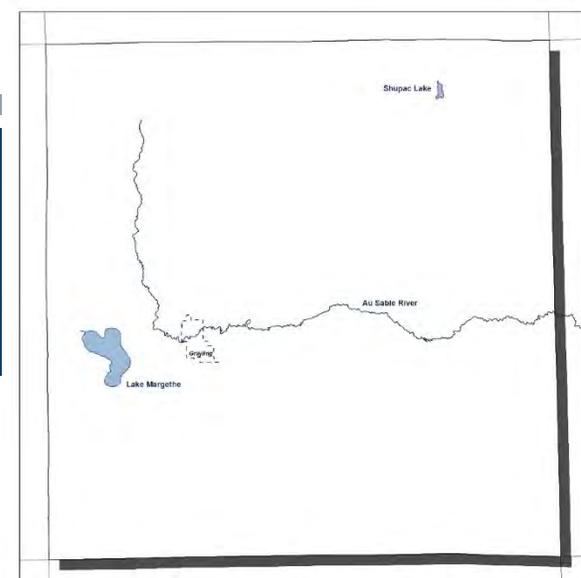


# The Michigan Fish Consumption Advisory Program

Michigan Department of  
Health and Human Services

[www.mi.gov/EatSafeFish.com](http://www.mi.gov/EatSafeFish.com)

# Au Sable River (Upstream of Mio Dam)



Type of fish tested	Driving Chemical	Size of fish	Recommended MI servings per month
Brown Trout	Mercury	Any	4
Northern Pike	Mercury	Under 30"	2
		Over 30"	1

# Lake Margrethe



Type of fish tested	Driving Chemical	Size of fish	Recommended MI servings per month
Bluegill	PFOS	Any	8
Sunfish	PFOS	Any	8
Largemouth and small mouth bass	Mercury	Under 18"	2
		Over 18"	1
<b>Walleye</b>	Mercury	Under 20"	1
		Over 20"	6 per year

# Foam

**Naturally occurring Foam**



**PFAS-containing Foam**





## Avoid Foam



- Foam may have high amounts of PFAS.
- Rinse off foam after contact. Rinsing in the lake or river is okay.
- Bathe or shower after the day's outdoor activities.
- Touching the **water** is *not a concern*. Enjoy swimming, boating, and fishing.
- Incidental swallowing of **foam** with high levels of PFAS is a *concern*.
- Do not allow pets to drink foamy water.
- Rinse pets with fresh water after contact with foam to avoid swallowing PFAS that may be on their fur.



# Additional Resources

- Michigan PFAS Action Response Team (MPART)  
[www.michigan.gov/pfasresponse](http://www.michigan.gov/pfasresponse)
- Environmental Protection Agency (EPA)  
[www.epa.gov/pfas](http://www.epa.gov/pfas)
- Agency for Toxic Substances and Disease Registry (ATSDR)  
<https://www.atsdr.cdc.gov/pfas/>

# MDHHS – Toxicology and Response Section

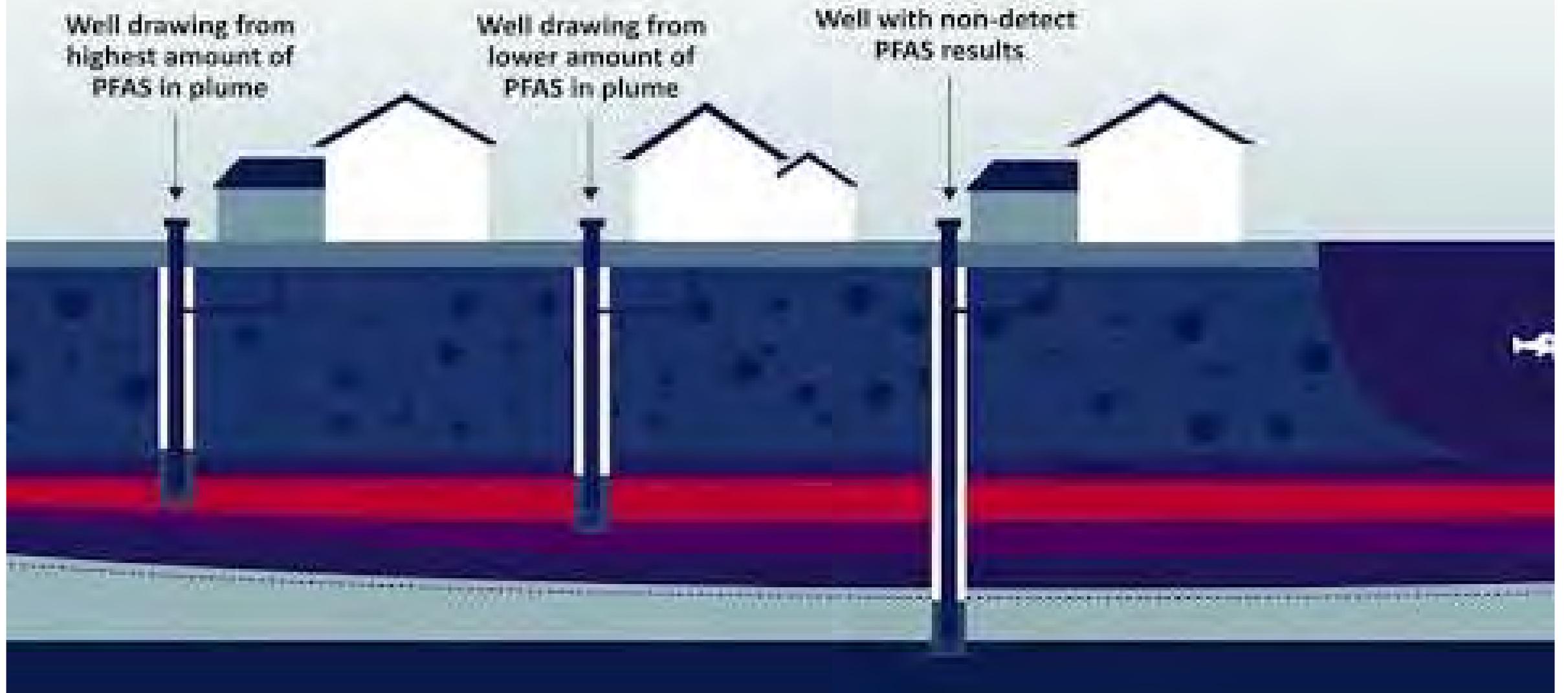
**Deb Mackenzie-Taylor, PhD**  
Toxicologist Manager

**Sesha Kallakuri, MS**  
Toxicologist

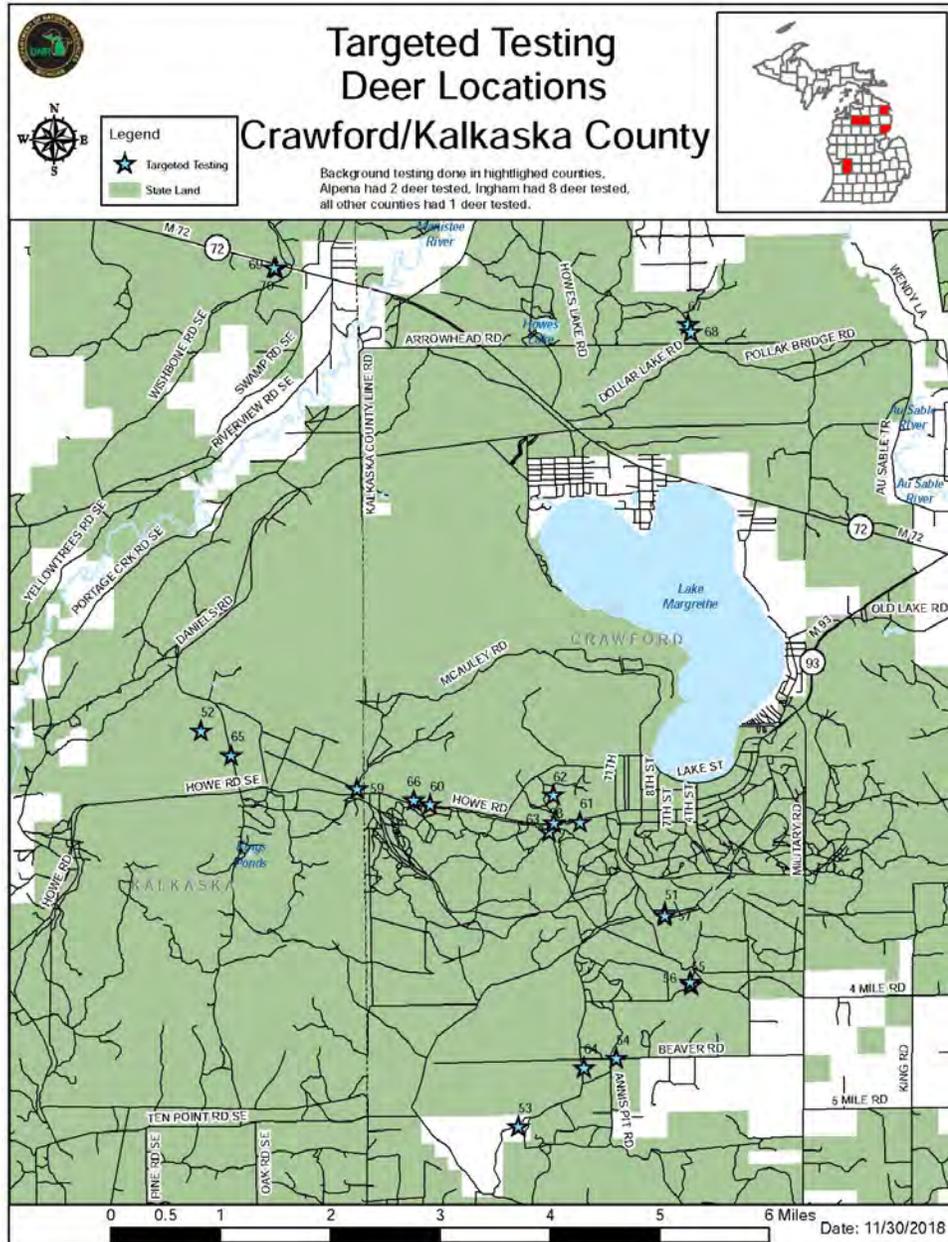
**Lakecia Powell-Denson, MPH**  
Health Educator



# Appendices



<https://www.youtube.com/watch?v=QMaGscHtHco&feature=youtu.be>



Deer Sampling Area - Grayling

# Eat Safe Wild Game - Grayling

- 20 deer were collected from Grayling area
- Collection of muscle, liver, kidney, and fat
- Non-detect to very low levels of PFAS tested in deer meat
- Very little scientific information exists on whitetail deer and PFAS chemicals
- Additional testing and modeling studies to understand PFAS consumption in wildlife
- [www.michigan.gov/eatsafegame](http://www.michigan.gov/eatsafegame)



# CONTRACTING



**Contract Type: State Design/Build**

## **Contracting Timelines:**

- Request for Proposal issued: 31 July
- Bids due: 21 August / Emergency session 4 September
- State of Michigan Add Board: 12 September / Emergency session 26 September



# CONTRACTING



- Scope of work “not equal” to available funding
- State Design/Build is complicated
- Township option scope of work is complicated
- Multiple variables due to limited time
- Scope of work phased to maximize available federal funding (city design/construction; township design; township system construction, township pipes)