STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

January 31, 2020

VIA E-MAIL AND U.S. MAIL

Dr. Stephen G. Termaath, GS-15, DAF
AFCEC/CIBE
Chief, BRAC Program Management Division
Installations Directorate
2261 Hughes Avenue, Suite 155
JBSA Lackland, Texas 78236-9853

Dear Dr. Termaath:

SUBJECT: Interim Actions to remove Per- and Polyfluoroalkyl Substances (PFAS); Former Wurtsmith United States Air Force Base; Iosco County, Michigan; Site ID No. 35000058

The Department of Environment, Great Lakes, and Energy (EGLE) requests that the Air Force Civil Engineer Center (AFCEC) perform actions concurrently with Remedial Investigation planning and implementation to address PFAS in groundwater and soil. These could take the form of early actions, interim remedial actions, or time critical or non-time critical removal actions. EGLE requests these actions include the following, but are not limited to 1) extending the capture zone of PFAS contaminated groundwater and increasing the pumping rate at FT-02 groundwater pump and treat system, 2) removal of PFAS from the beach plumes along Van Etten Lake, and 3) removal of PFAS contaminated soil, sediment, and groundwater upgradient of Clarks Marsh, in vicinity of the former wastewater treatment plant (WWTP). Additionally, EGLE supports the expansion of the Mission Street Groundwater Treatment System as proposed in the Expanded Site Investigation (ESI).

- EGLE requests the FT-02 groundwater pump and treatment system is expanded with additional extraction wells to capture PFAS contaminated groundwater where it exceeds Part 201 Groundwater-Surface Water Interface (GSI) criteria. In the December 2019 PFOS/PFOA ESI, AFCEC concluded to evaluate expansion of the FT-02 monitoring network. Currently groundwater with PFOS/PFOA concentrations above the Lifetime Health Advisory (LHA) and Part 201 Drinking Water Criteria (DWC), and Part 201 GSI Criteria is discharging outside of the current FT-02 capture zone, beyond the former base boundary into Clarks Marsh. Additionally, in an October 19, 2018, Notice of Violation, EGLE Water Resources Division requested AFCEC increase the pumping rate at FT-02 from 250 to 1,040 gallons per minute.

- EGLE requests that actions are taken to prevent the migration of Van Etten Lake Beach plumes, including PFAS contaminated groundwater in the vicinity of Air

Force Beach (ESI Aqueous Film Forming Foam (AFFF) Areas 1 and 15), as a priority, and in the vicinity of Pierce's Point (ESI AFFF Areas 4 and 6). In these areas it is clear that significant levels of PFAS are migrating to and beyond the base boundaries toward residential areas and Van Etten Lake above the combined PFOA/PFOS LHA and Part 201 DWC and Part 201 PFOS GSI criteria. These actions could include the installation of additional groundwater extraction wells to better control the continued migration of contaminated groundwater while a final remedy is being developed. These extraction wells could be connected to existing groundwater treatment systems or additional treatment systems could be installed.

- EGLE requests removal of PFAS contaminated soil, sediment, and groundwater near the former WTTP and upgradient of Clarks Marsh. Based on the Site Inspection (SI) sampling, PFOS concentrations in soil and sediment exceed the Part 201 GSI Protection Criteria in WWTP Areas 11 and 9 from depths between 0 to 1 foot below ground surface. Of these areas, the highest detected PFOS soil concentrations were in WWTP SI AFFF Area 11, also referred to in the Preliminary Assessment as AFFF Area 19: WWTP Sludge Disposal Area. Removal of the contaminated soil and sediment above the PFOS GSI Protection Criteria will reduce source material contributing to the PFAS groundwater plume upgradient of Clarks Marsh. Additionally, EGLE requests the removal of PFAS contaminated groundwater in the vicinity of the former WWTP. Groundwater with PFOS/PFOA concentrations above the LHA and Part 201 DWC, and Part 201 GSI Criteria were detected in the SI AFFF Areas 9 and 11 flowing towards Clarks Marsh.

- As proposed in the ESI, EGLE supports the extension of the Mission Street Groundwater pump and treatment system to capture PFAS contaminated water that contains concentrations of PFOA/PFOS above the LHA and Part 201 DWC, and PFOS above Part 201 GSI Criteria from ESI AFFF Areas 2 and 7. ESI AFFF Areas 2 and 7 are located upgradient of potential residential receptors.

As per the attached United States Environmental Protection Agency memorandum, *Use of Early Actions at Superfund National Priorities List Sites and Sites with Superfund Alternative Approach Agreements, August 23, 2019*, such early actions are encouraged and can yield significant benefits to the achieving long-term cleanup goals. Such actions would serve to limit contaminant migration and may serve to provide risk reduction.

The recommended early actions to limit PFAS migration in the groundwater are consistent with the existing and anticipated future remedial action objectives at the site. The existing Remedial Action Operations typically include restoring the groundwater to industrial or residential drinking water on the base and restoring off base groundwater to residential drinking water criteria. Where significant groundwater contamination exists, the selected remedies have included groundwater pump and treat systems. In the recommended areas for early action, significant exceedances of the residential drinking

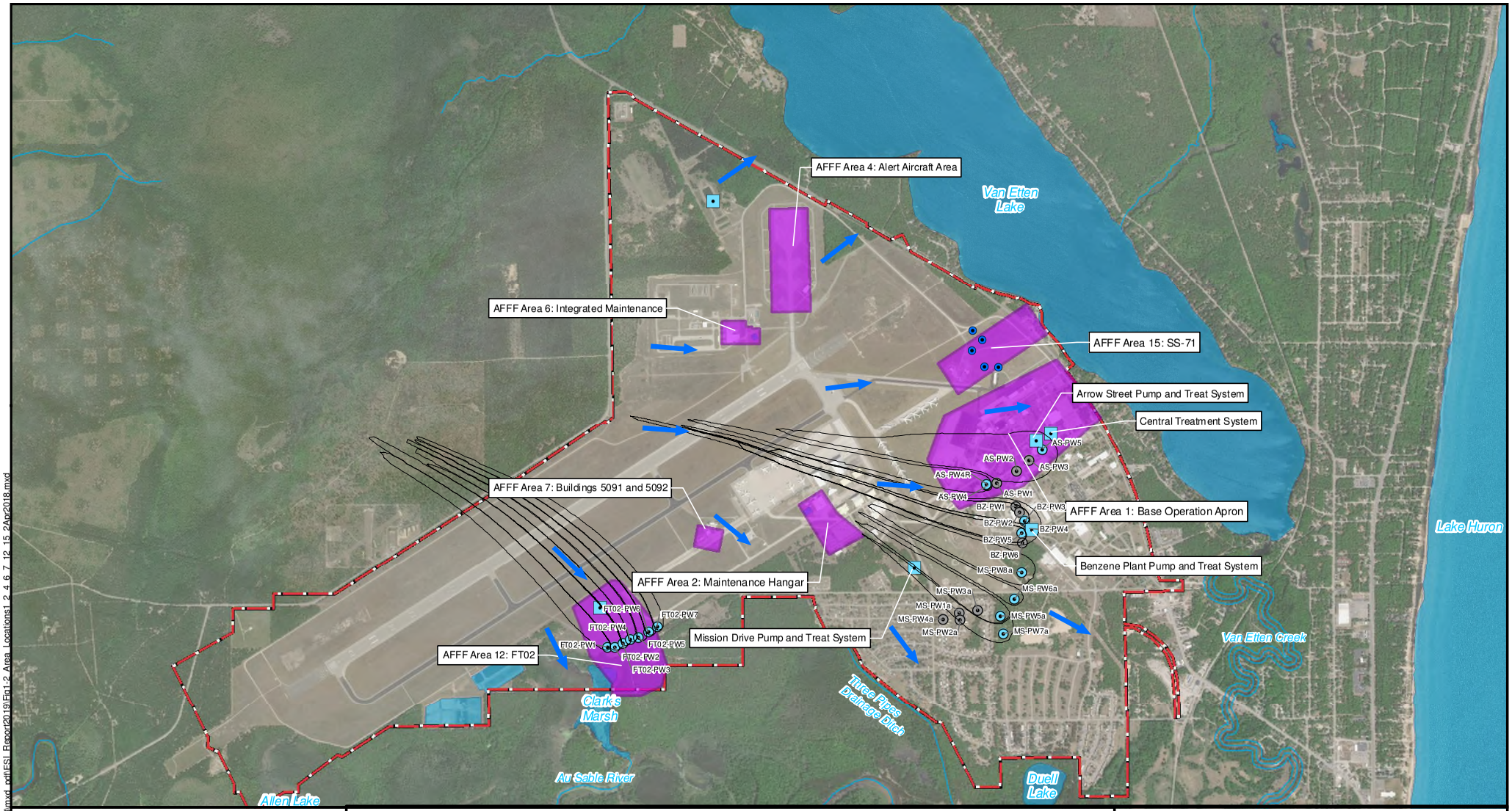
water criteria for PFAS exists. It is reasonable to expect that upon completion of the Remedial Investigation/Feasibility Study, that the objectives and remedies for PFAS groundwater contamination will be substantially consistent with the existing groundwater remedies. Therefore, it is expected that early action pump and treat systems will be consistent with the anticipated long-term remedies.

Should you require further information of a technical nature, please contact Ms. Beth Place, Superfund Section, Remediation and Redevelopment Division, at 517-899-7524; PlaceB1@Michigan.gov; or EGLE, P.O. Box 30473, Lansing, Michigan 48909-7973; or you may contact me.

Sincerely,

Mike Neller, Director
Remediation and Redevelopment Division
517-284-5144

Enclosures
cc/enc: Mr. Dave Gibson, AFCEC
Ms. Teresa Seidel, EGLE
Mr. Josh Mosher, EGLE
Mr. David Kline, EGLE
Mr. John Bradley, EGLE
Mr. Charlie Bauer, EGLE
Mr. Dan Yordanich, EGLE
Ms. Beth Place, EGLE
Mr. Matt Baltusis, EGLE



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N

Project: 775329301

By: DGJ | Date: 01/17/2020

0 1,000 2,000 4,000 Feet

SYMBOL KEY

- Estimated Capture Zone (Baywest 2018)
- Groundwater Treatment System
- Former Base Supply Well
- Active Purge Well
- Inactive Purge Well
- Estimated Groundwater Flow Direction
- AFFF ESI Priority
- Former Wurtsmith AFB Installation Boundary
- Stream
- Surface Water

AFFF Area 1 - Base Operation Apron
AFFF Area 2 - Maintenance Hangar
AFFF Area 4 - Alert Aircraft Area
AFFF Area 6 - Integrated Maintenance
AFFF Area 7 - Building 5091 and 5092
AFFF Area 12 - FT02
AFFF Area 15 - Site SS-71

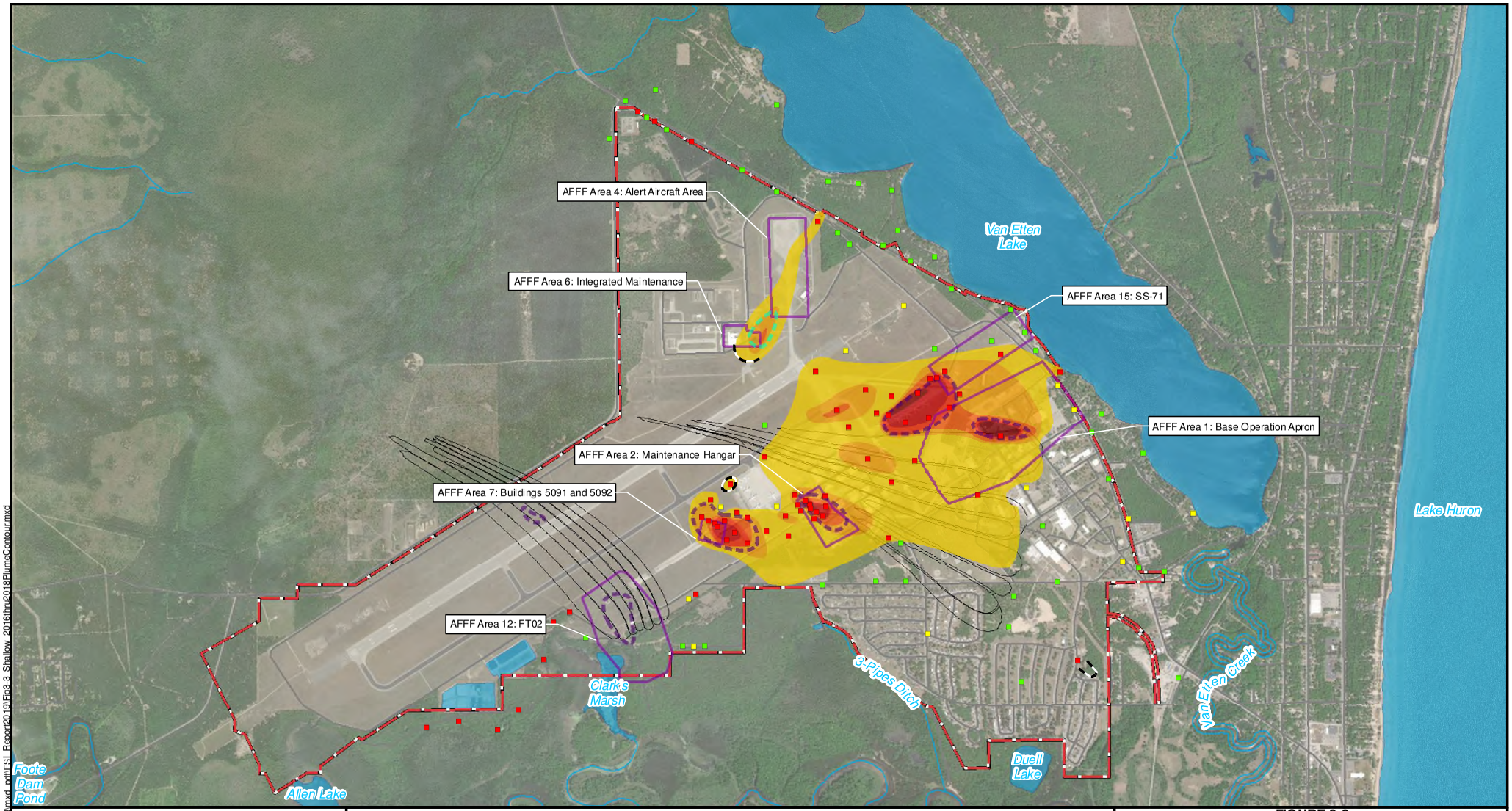
FIGURE 1-2

AFFF Areas 1, 2, 4, 6, 7, 12, and 15

Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report

Document Path: G:\Wurtsmith ANG\mxd_pdf\ESI Report\2019\Fig1-2 Area_Locations1_2_4_6_7_12_15_2Apr2018.mxd



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0 1,000 2,000 4,000 Feet

SYMBOL KEY

VAS Sample
- PFOS < 12 ppt and PFOS + PFOA < 70 ng/L
- PFOS > 12 ppt and PFOS + PFOA < 70 ng/L
- PFOS + PFOA > 70 ng/L
- Extrapolated Contour

PFOS+PFOA Concentration Contour (ng/L)
- 70-700
- 700-2,000
- 2,000-5,000
- 5,000-7,000
- 7,000-70,000
- >70,000

- Former Wurtsmith AFB Installation Boundary
- Stream
- Surface Water
- Capture Zones (Baywest 2018)
- Potential Release Area
- Suspected Source Area

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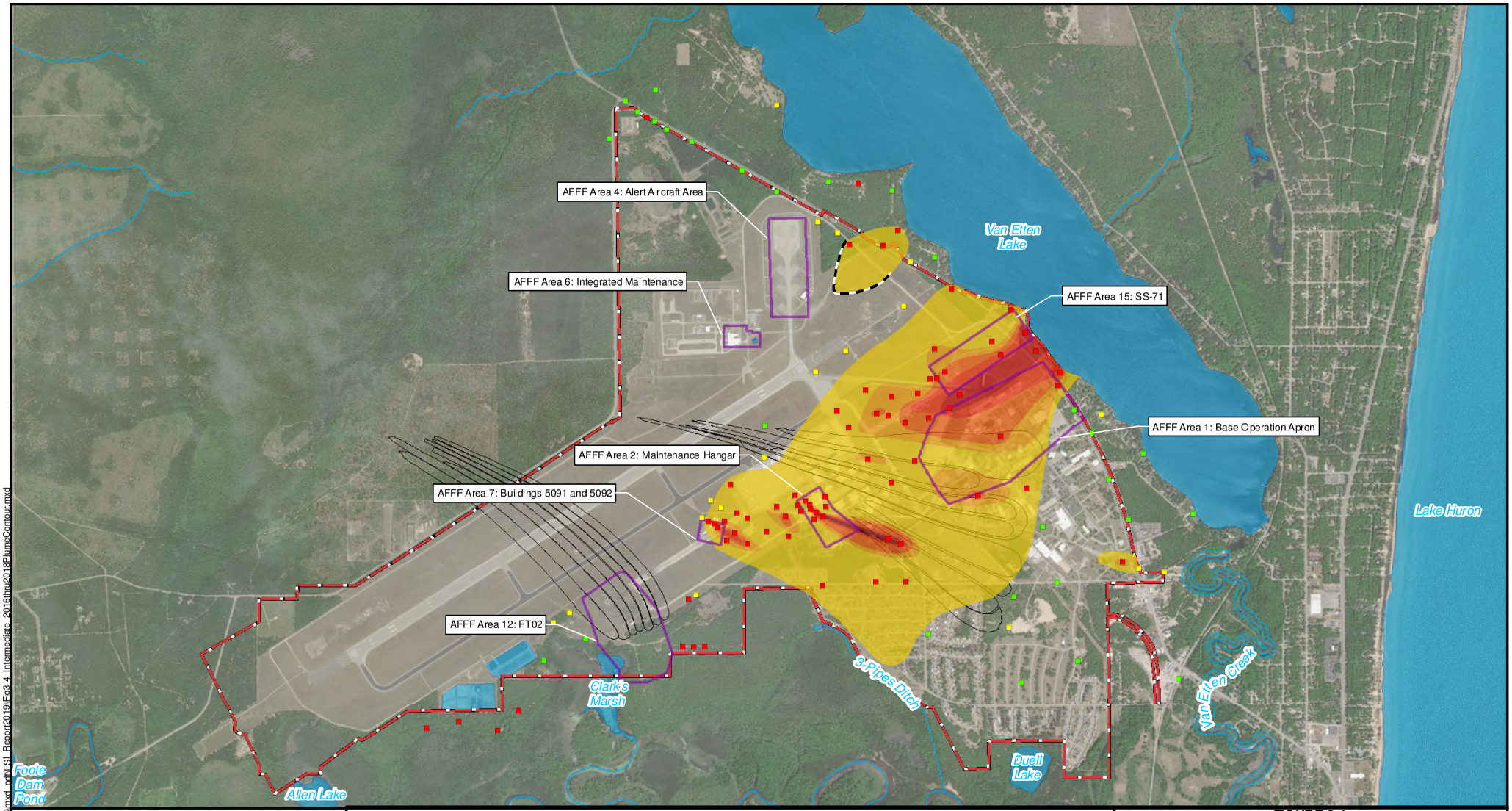
FIGURE 3-3
Approximate Extent of PFOS+PFOA Concentration Shallow Groundwater (10-25ft Below Ground Surface) Based on Vertical Aquifer Sampling
Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report

Document Path: G:\Wurtsmith ANG\mxd_pdf\ESI_Report2019\Fig3-3 Shallow_2016thru2018PlumeContour.mxd



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Project: 775329301

By: KEH | Date: 01/17/2020

0 1,000 2,000 4,000 Feet

SYMBOL KEY

VAS Sample
- PFOS < 12 ppt and PFOS + PFOA < 70 ng/L
- PFOS > 12 ppt and PFOS + PFOA < 70 ng/L
- PFOS + PFOA > 70 ng/L
- Extrapolated Contour

PFOS+PFOA Concentration Contour (ng/L)
- 70-700
- 700-2,000
- 2,000-5,000
- 5,000-7,000
- 7,000-70,000
- >70,000

- Former Wurtsmith AFB Installation Boundary
- Stream
- Surface Water
- Capture Zones (Baywest 2018)

Note: AFFF Area 12 results are shown on Figure 3-21

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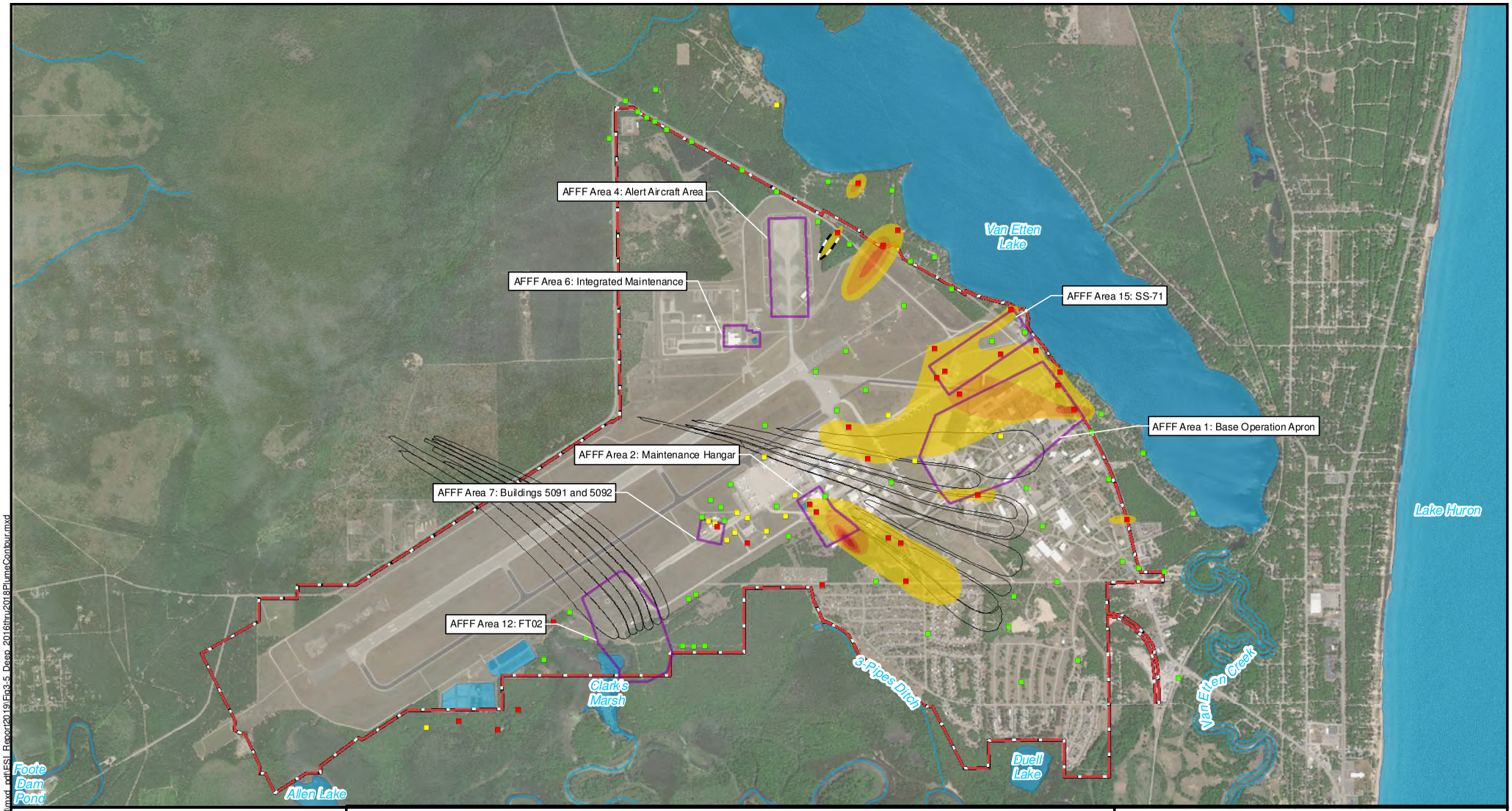
FIGURE 3-4
Approximate Extent of PFOS+PFOA Concentration Intermediate Groundwater (25-40ft Below Ground Surface) Based on Vertical Aquifer Sampling
Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report

Document Path: G:\Wurtsmith ANG\mxd_pdf\ESI Report\2019\Fig3-4 Intermediate 2016thru2018PlumeContour.mxd



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Project: 775329301

By: KEH | Date: 01/17/2020

0 1,000 2,000 4,000 Feet

SYMBOL KEY

VAS Sample
- PFOS < 12 ppt and PFOS + PFOA < 70 ng/L
- PFOS > 12 ppt and PFOS + PFOA < 70 ng/L
- PFOS + PFOA > 70 ng/L
- Extrapolated Contour

PFOS+PFOA Concentration Contour (ng/L)
- 70-700
- 700-2,000
- 2,000-5,000
- 5,000-7,000
- 7,000-70,000

- Former Wurtsmith AFB Installation Boundary
- Stream
- Surface Water
- Capture Zones (Baywest 2018)

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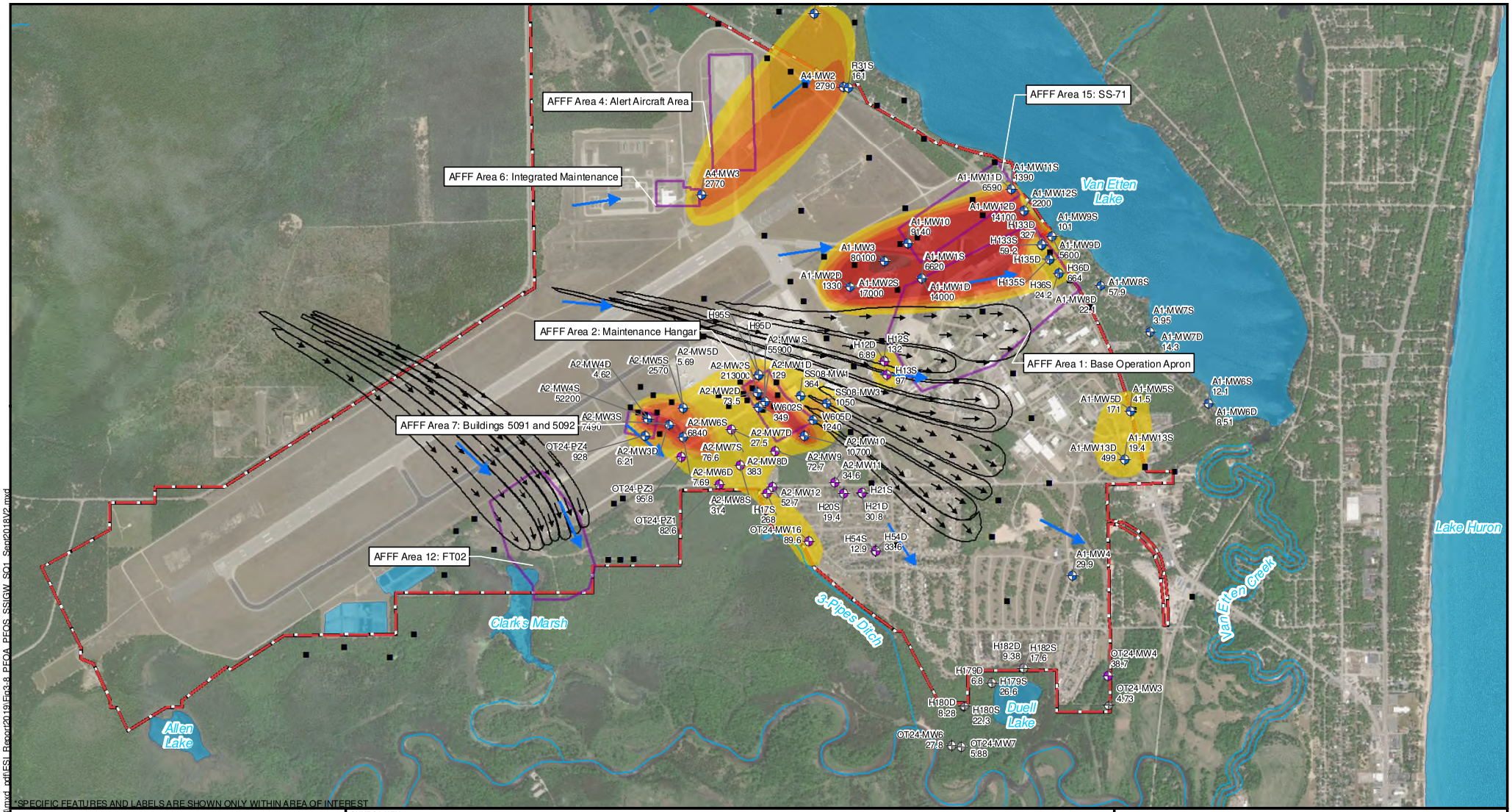
FIGURE 3-5
Approximate Extent of PFOS+PFOA Concentration Deep Groundwater (40+ft Below Ground Surface) Based on Vertical Aquifer Sampling
Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report

Document Path: G:\Wurtsmith ANGB\mxd_pdf\ESI_Report2019\Fig3-5_Deep_2016thru2018PlumeContour.mxd



*SPECIFIC FEATURES AND LABELS ARE SHOWN ONLY WITHIN AREA OF INTEREST

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Project: 775329301

By: DGJ | Date: 01/17/2020

N

0 1,000 2,000 4,000 Feet

SYMBOL KEY

- Groundwater Monitoring Well
- 1330.9 PFOS + PFOA Concentration, ng/L
- Initial Sampling Only (October 2018)
- Quarterly Sampling
- Semi-Annual Sampling
- VAS Sample Location
- Former Wurtsmith AFB Installation Boundary
- Surface Water/Lagoons
- Groundwater Flow (Bay West, 2017)
- 2018 Capture Zones (Baywest)

Concentration, ng/L

- Previous 70 ng/L contour based on groundwater and VAS analytical
- 70 < PFOS+PFOA < 700
- 700 < PFOS+PFOA < 2,000
- 2,000 < PFOS+PFOA < 5,000
- 5,000 < PFOS+PFOA < 7,000
- 7,000 < PFOS+PFOA < 70,000
- PFOS+PFOA >70,000

NOTE:
Concentration contours were developed using the highest concentrations of nested well pairs no matter well depth.

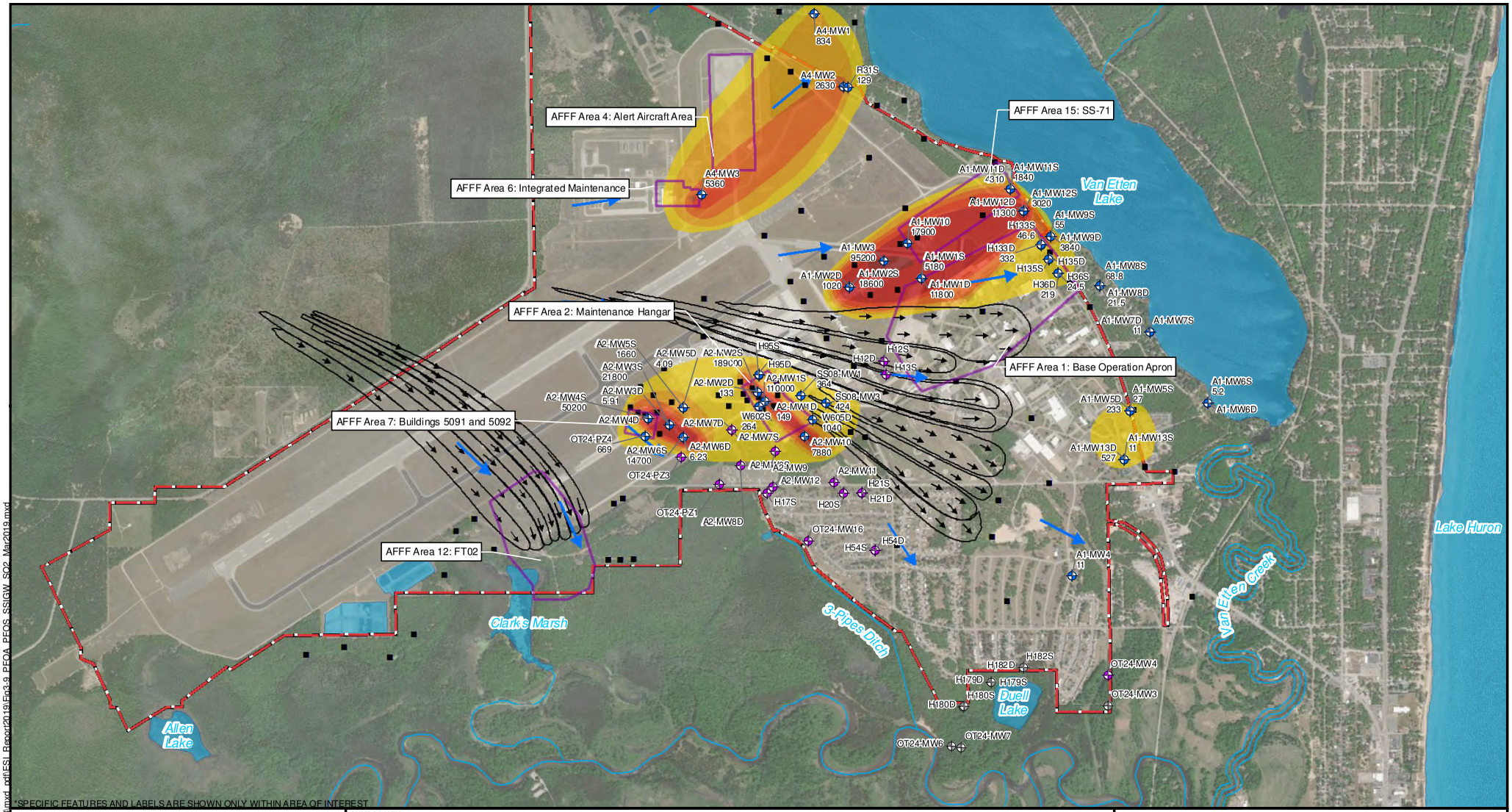
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctane sulfonate
VAS = Vertical Aquifer sample

FIGURE 3-8

PFOS PFOA Concentration Contour - September 2018

Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report



*SPECIFIC FEATURES AND LABELS ARE SHOWN ONLY WITHIN AREA OF INTEREST

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Project: 775329301

By: DGJ | Date: 01/17/2020

0 1,000 2,000 4,000 Feet

SYMBOL KEY

- Groundwater Monitoring Well
- 1330.9 PFOS + PFOA Concentration, ng/L
- Initial Sampling Only (October 2018)
- Quarterly Sampling
- Semi-Annual Sampling
- VAS Sample Location
- Former Wurtsmith AFB Installation Boundary
- Surface Water/Lagoons
- Groundwater Flow (Bay West, 2017)
- 2018 Capture Zones (Baywest)

Concentration, ng/L

- Previous 70 ng/L contour based on groundwater and VAS analytical
- 70 < PFOS+PFOA < 700
- 700 < PFOS+PFOA < 2,000
- 2,000 < PFOS+PFOA < 5,000
- 5,000 < PFOS+PFOA < 7,000
- 7,000 < PFOS+PFOA < 70,000
- PFOS+PFOA >70,000

NOTE:
Concentration contours were developed using the highest concentrations of nested well pairs no matter well depth.

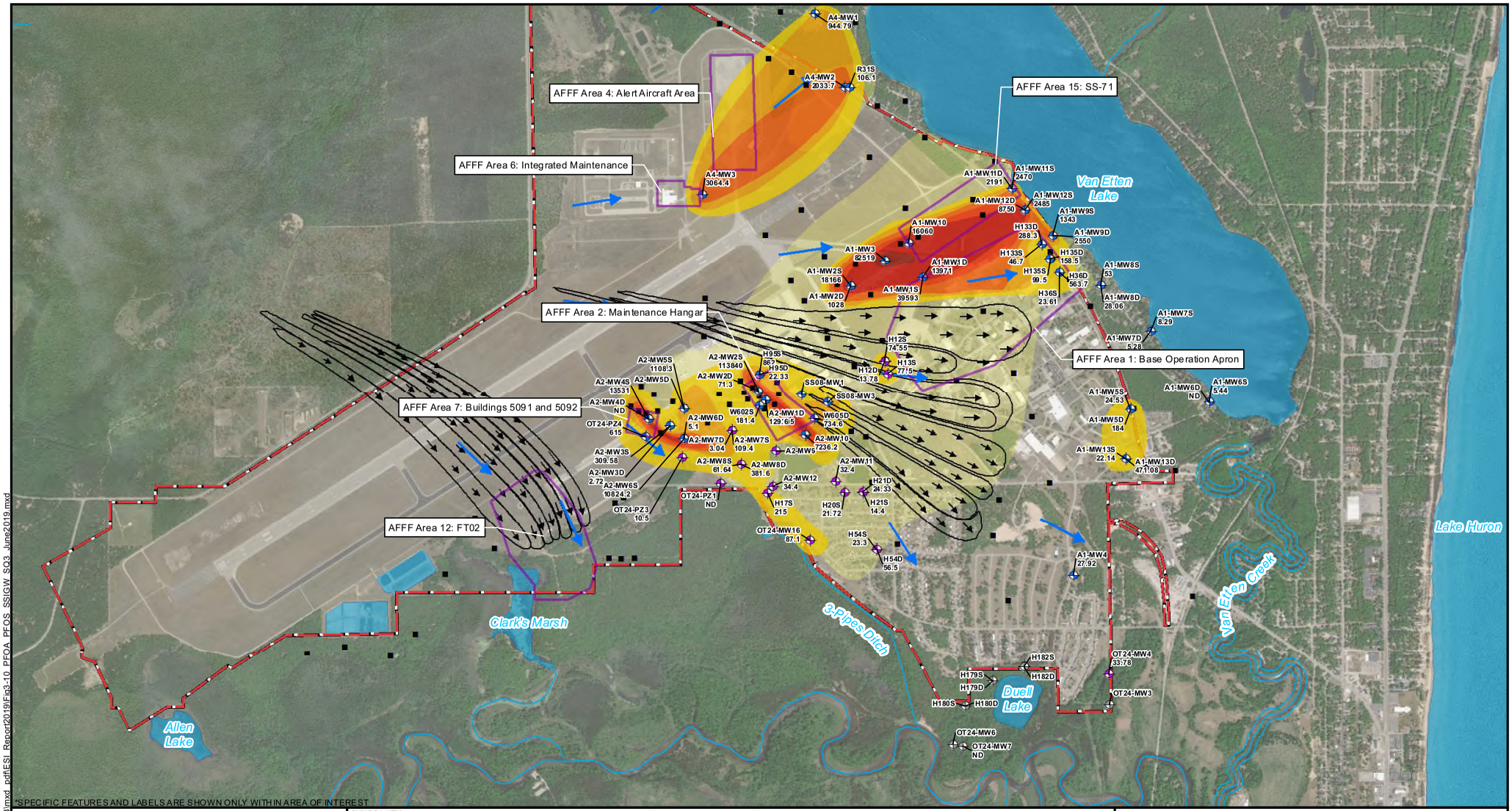
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctane sulfonate
VAS = Vertical Aquifer sample

FIGURE 3-9

PFOS PFOA Concentration Contour - March 2019

Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report



*SPECIFIC FEATURES AND LABELS ARE SHOWN ONLY WITHIN AREA OF INTEREST

SYMBOL KEY

- Groundwater Monitoring Well
- 1330.9 PFOS + PFOA Concentration, ng/L
- Initial Sampling Only (October 2018)
- Quarterly Sampling
- Semi-Annual Sampling
- VAS Sample Location
- Former Wurtsmith AFB Installation Boundary
- Surface Water/Lagoons
- Groundwater Flow (Bay West, 2017)
- 2018 Capture Zones (Baywest)

Concentration, ng/L

- Previous 70 ng/L contour based on groundwater and VAS analytical
- 70 < PFOS+PFOA < 700
- 700 < PFOS+PFOA < 2,000
- 2,000 < PFOS+PFOA < 5,000
- 5,000 < PFOS+PFOA < 7,000
- 7,000 < PFOS+PFOA < 70,000
- PFOS+PFOA > 70,000

NOTE:
Concentration contours were developed using the highest concentrations of nested well pairs no matter well depth.

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Project: 775329301

By: DGJ | Date: 11/04/2019

0 1,000 2,000 4,000 Feet

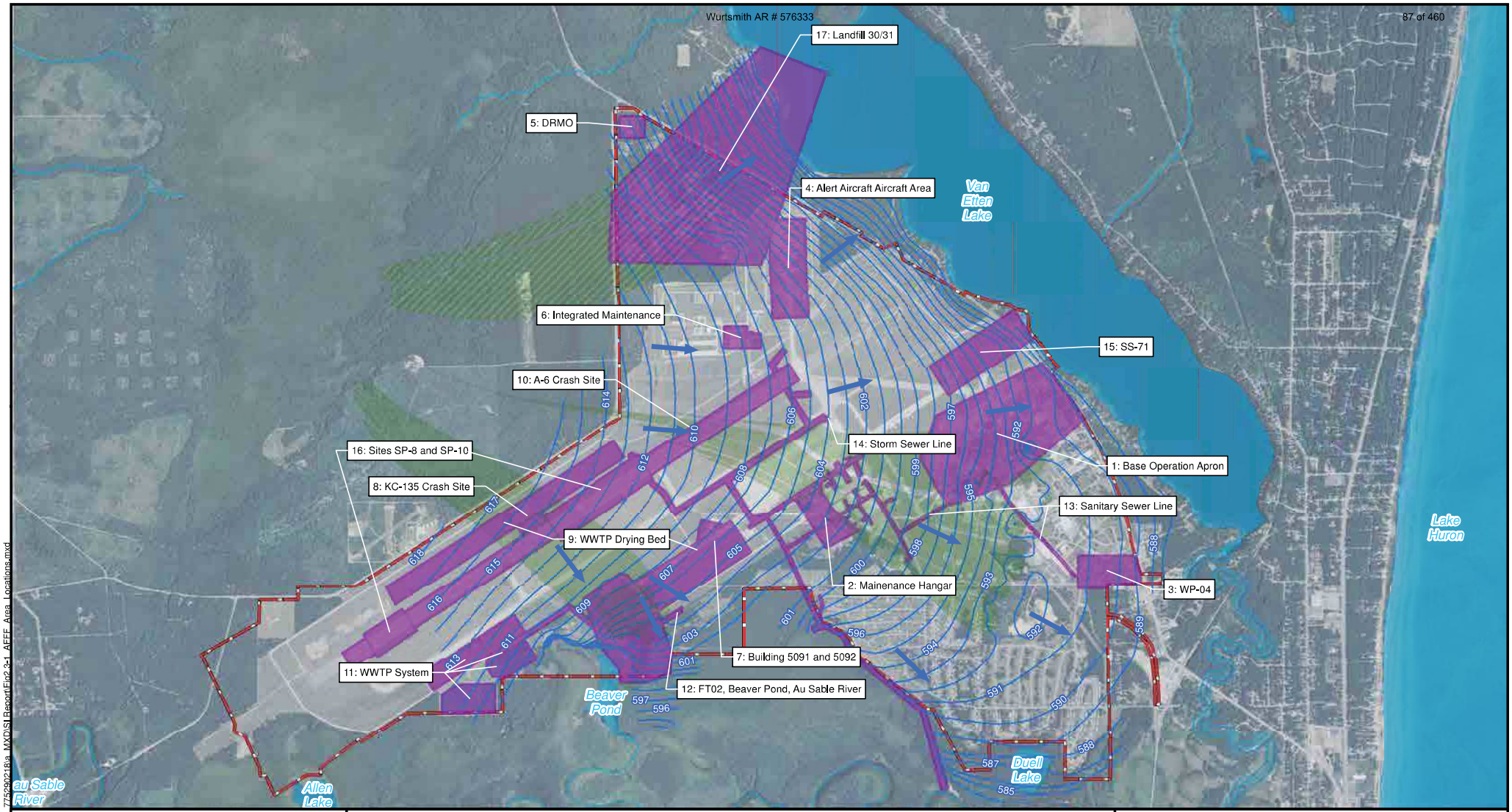
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctane sulfonate
VAS = Vertical Aquifer sample

FIGURE 3-10

PFOS+PFOA Concentration Contour - June 2019
Former Wurtsmith Air Force Base
Oscoda, Michigan

Expanded Site Inspection Report

Document Path: G:\Wurtsmith ANGB\mxd pdf\ESI Report2019\Fig3-10 PFOA PFOS SSGW SG3 June2019.mxd



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Project: 775290177

By: AES | Date: 03/10/2017

0 1,000 2,000 4,000 Feet

SYMBOL KEY

- Estimated Capture Zone
- Engineered Wetland
- Estimated Groundwater Flow Direction
- Water Table Contours (November 2016)
- AFFF Area
- Former Wurtsmith AFB Installation Boundary
- Stream
- Surface Water

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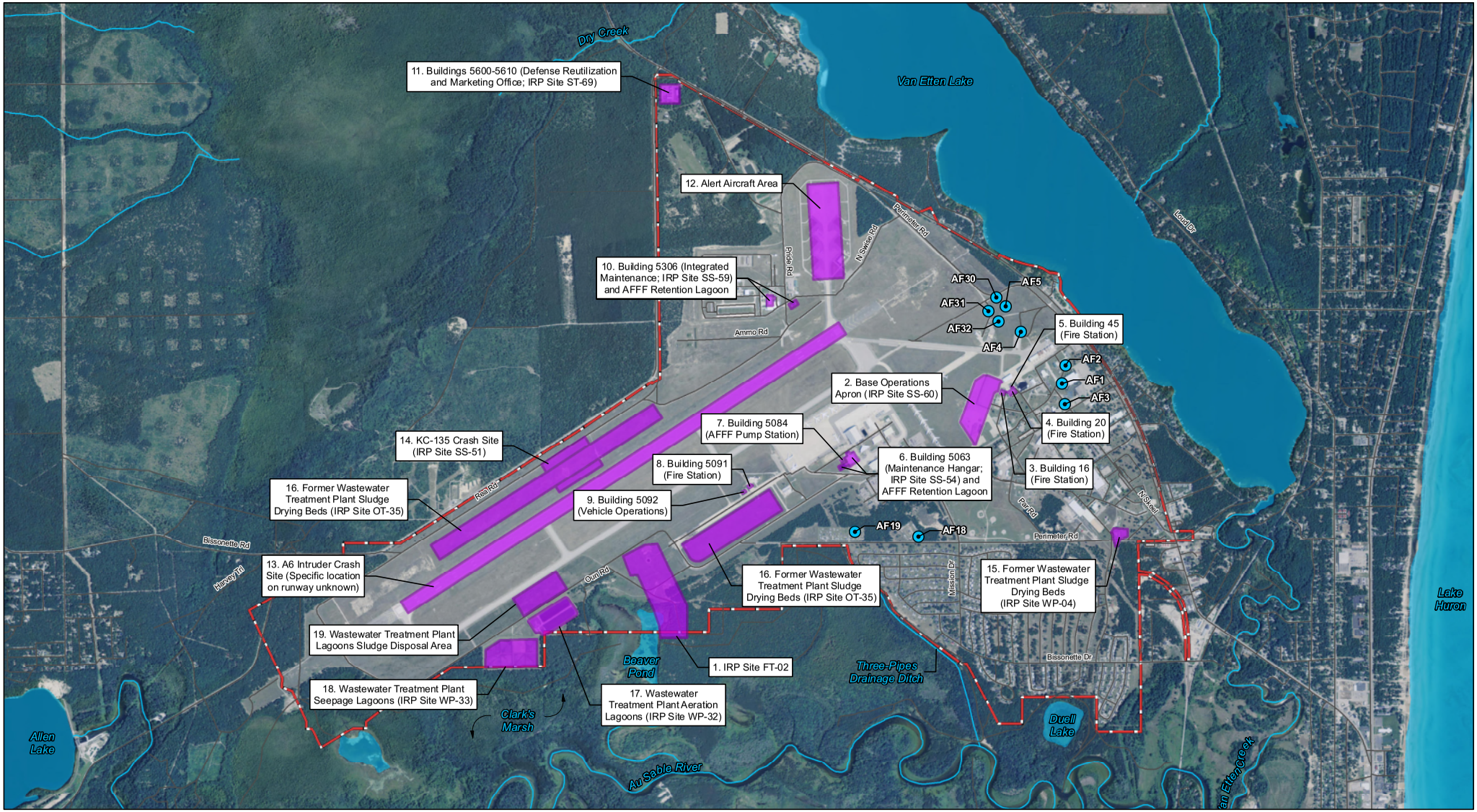
Service Layer Credits: Aerial Imagery obtained through ESRI Online Services

FIGURE 2.3-1
AFFF SI Area Locations
Former Wurtsmith Air Force Base
Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas

Document Path: G:\Wurtsmith\PEGs_775290177\Fig_MXD\SI Report\Fig2-3-1 AFFF Area Locations.mxd



SYMBOL KEY

- Water Supply Well (inactive)
- AFFF Area with a Potential for PFCs Presence
- Road
- Stream
- Former Wurtsmith AFB Installation Boundary
- Surface Water

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0 250 500 1,000 1,500 2,000 Meters

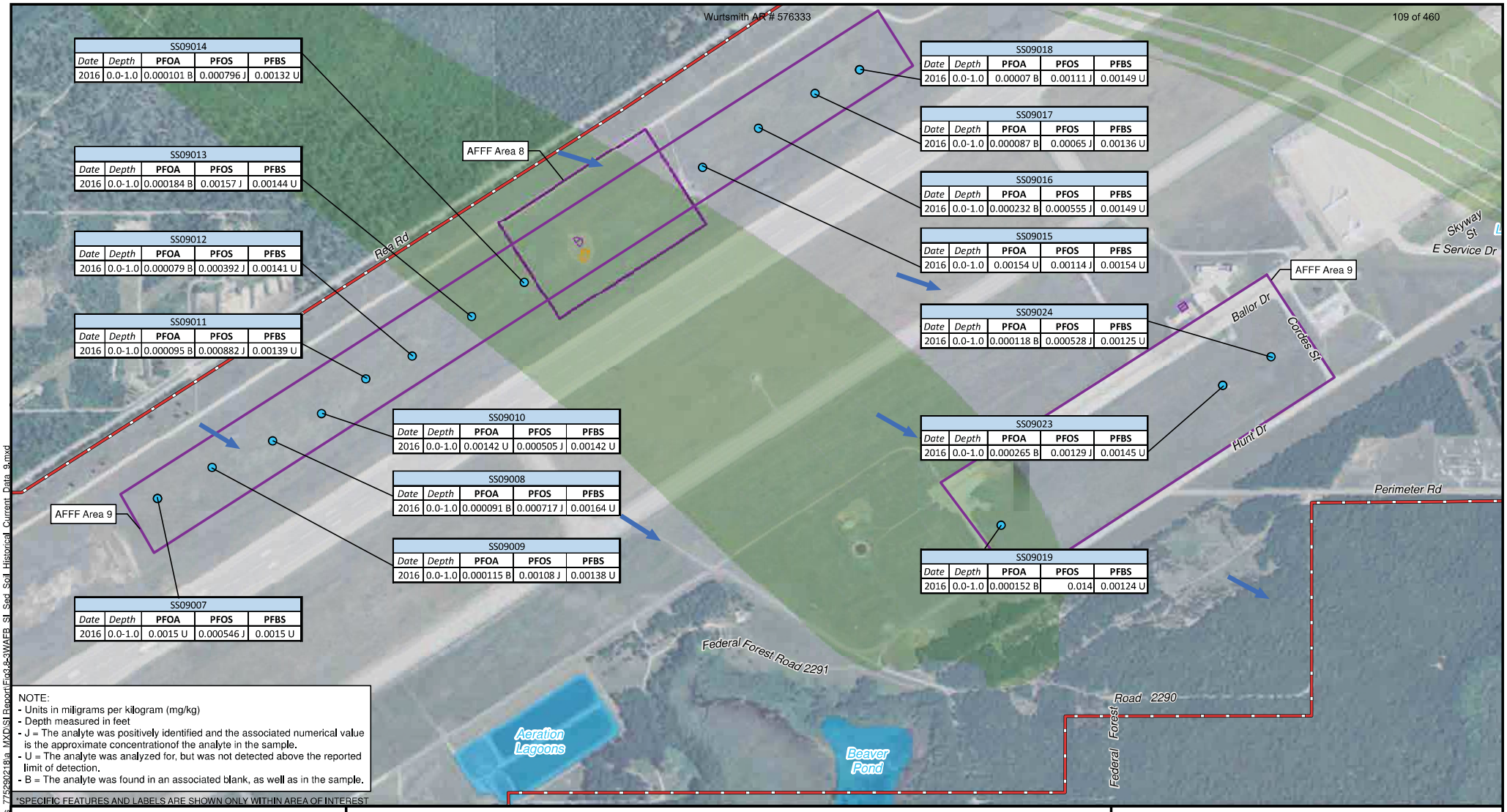
0 500 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 Feet

FIGURE 3
Potential AFFF Areas
PFC Preliminary Assessment
Former Wurtsmith Air Force Base, Oscoda, MI

NOTES:
-Aerial Imagery obtained through ESRI Online Services

09/18/2015 | Wurtsmith_AFB_AFFF_Areas_PPA

Drawn: JNR | PROJ: 775290177



NOTE:
- Units in milligrams per kilogram (mg/kg)
- Depth measured in feet
- J = The analyte was positively identified and the associated numerical value is the approximate concentrationof the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the reported limit of detection.
- B = The analyte was found in an associated blank, as well as in the sample.

*SPECIFIC FEATURES AND LABELS ARE SHOWN ONLY WITHIN AREA OF INTEREST

Document Path: G:\Wurtsmith\PFCs_775290218a_MXD\SI Report\Fig3.8-3WAFB_SI_Sed_Soil_Historical_Current_Data_9.mxd

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Project: 775290177

By: AES | Date: 05/04/2017

0 300 600 1,200 Feet

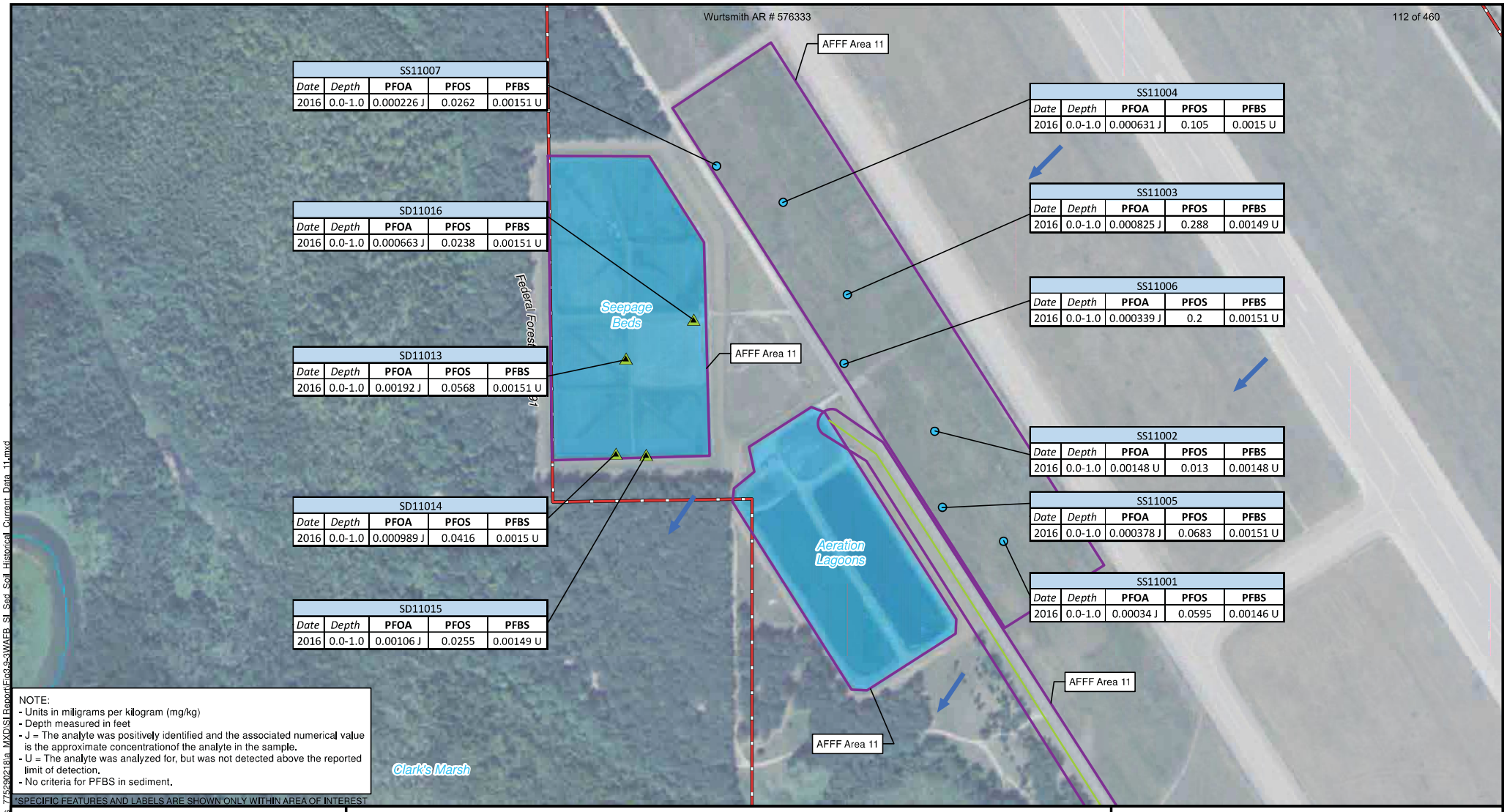
SYMBOL KEY

- Soil Boring Sample
- 2016 Sampling Results
- Estimated Capture Zone
- Former Excavation Area
- Former Land Farm Plot
- Surface Water
- AFFF Area
- Former Wurtsmith AFB Installation Boundary
- Estimated Groundwater Flow Direction

PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
PFBS = Perfluorobutane sulfonate

FIGURE 3.8-3
AFFF Area 9
PFAS with Applicable Criteria in Soil
WWTP Drying Bed
Former Wurtsmith Air Force Base, Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas



SS11007				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000226 J	0.0262	0.00151 U

SD11016				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000663 J	0.0238	0.00151 U

SD11013				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.00192 J	0.0568	0.00151 U

SD11014				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000989 J	0.0416	0.0015 U

SD11015				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.00106 J	0.0255	0.00149 U

SS11004				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000631 J	0.105	0.0015 U

SS11003				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000825 J	0.288	0.00149 U

SS11006				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000339 J	0.2	0.00151 U

SS11002				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.00148 U	0.013	0.00148 U

SS11005				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.000378 J	0.0683	0.00151 U

SS11001				
Date	*Depth*	**PFOA**	**PFOS**	**PFBS**
2016	0.0-1.0	0.00034 J	0.0595	0.00146 U

NOTE:
- Units in miligrams per kilogram (mg/kg)
- Depth measured in feet
- J = The analyte was positively identified and the associated numerical value is the approximate concentrationof the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the reported limit of detection.
- No criteria for PFBS in sediment.

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Document Path: G:\Wurtsmith\PFCs_775290218a_MXD\SI Report\Fig3.9-3WAFB_SI_Sed_Soil_Historical_Current_Data_11.mxd

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Project: 775290177

By: AES | Date: 05/04/2017

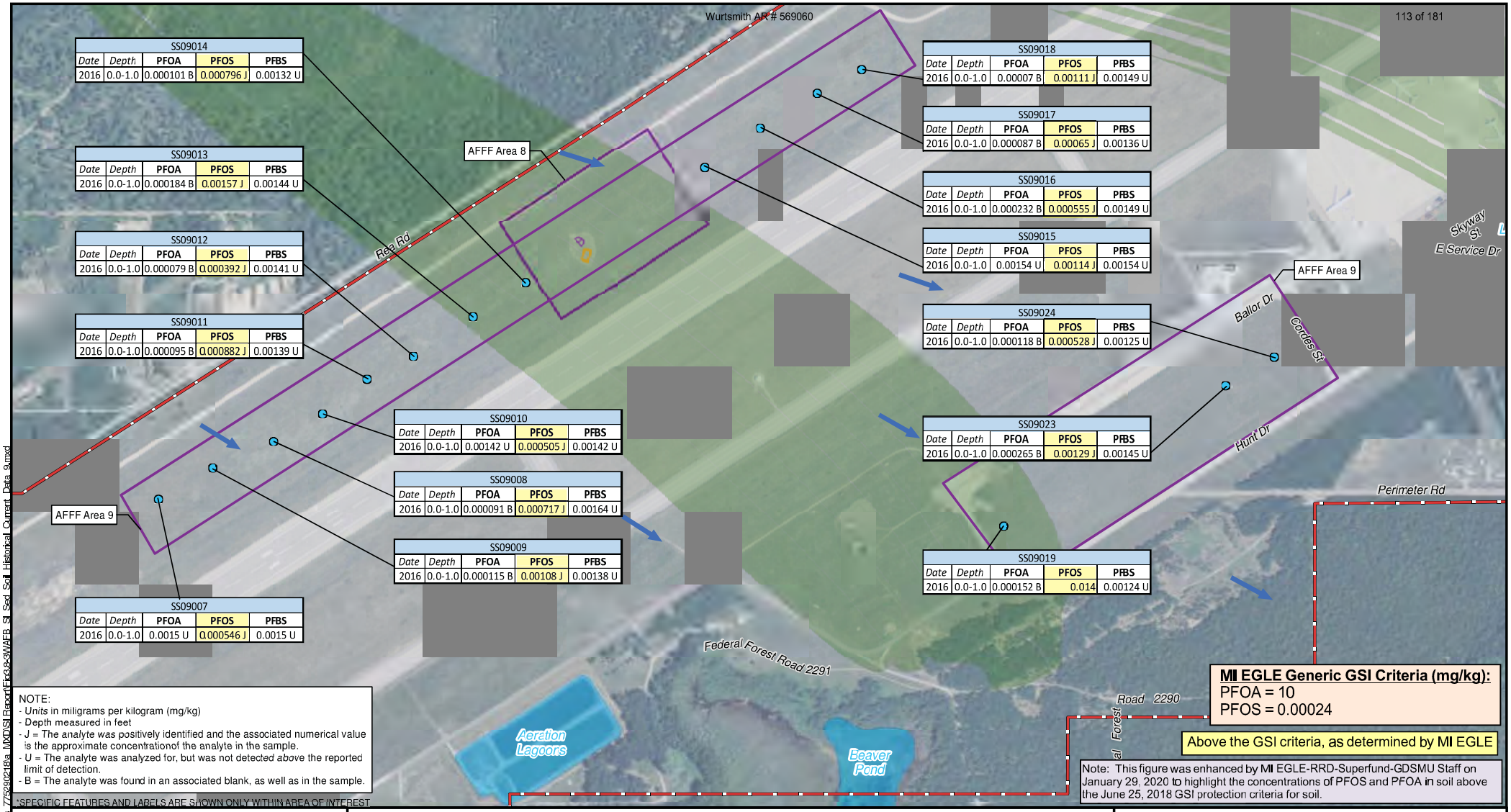
0 175 350 700 Feet

SYMBOL KEY

- Soil Boring Sample
- Sediment Sample
- 2016 Sampling Results
- AFFF Area
- Former Wurtsmith AFB Installation Boundary
- Sanitary Sewer
- Estimated Groundwater Flow Direction
- Streams
- Surface Water

FIGURE 3.9-3
AFFF Area 11
PFAS with Applicable Criteria in Soil and Sediment
WWTP System
Former Wurtsmith Air Force Base, Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas



NOTE:
- Units in miligrams per kilogram (mg/kg)
- Depth measured in feet
- J = The analyte was positively identified and the associated numerical value is the approximate concentrationof the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the reported limit of detection.
- B = The analyte was found in an associated blank, as well as in the sample.

*SPECIFIC FEATURES AND LABELS ARE SHOWN ONLY WITHIN AREA OF INTEREST

MI EGLE Generic GSI Criteria (mg/kg):
PFOA = 10
PFOS = 0.00024

Above the GSI criteria, as determined by MI EGLE

Note: This figure was enhanced by MI EGLE-RRD-Superfund-GDSMU Staff on January 29, 2020 to highlight the concentrations of PFOS and PFOA in soil above the June 25, 2018 GSI protection criteria for soil.

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N

Project: 775290177

By: AES | Date: 05/04/2017

0 300 600 1,200 Feet

SYMBOL KEY

- Soil Boring Sample
- 2016 Sampling Results
- Estimated Capture Zone
- Former Excavation Area
- Former Land Farm Plot
- Surface Water
- AFFF Area
- Former Wurtsmith AFB Installation Boundary
- Estimated Groundwater Flow Direction

Disclaimer: For general reference purposes only. This is not a survey product. DO NOT USE to determine, certify, or verify map features, scale and/or other information.

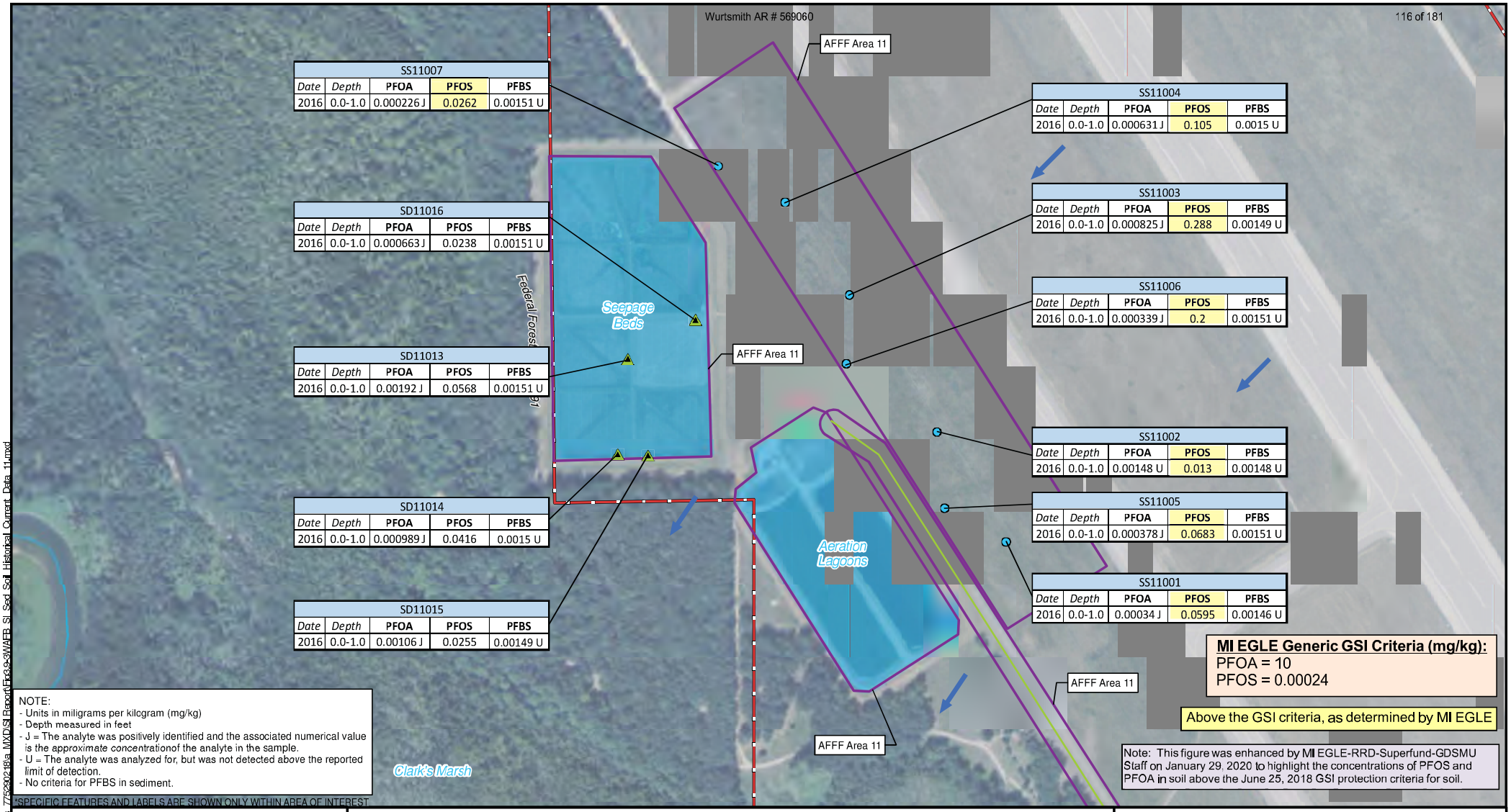
Service Layer Credits: Aerial Imagery obtained through ESRI Online Services

PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
PFBS = Perfluorobutane sulfonate

FIGURE 3.8-3
AFFF Area 9
PFAS with Applicable Criteria in Soil
WWTP Drying Bed
Former Wurtsmith Air Force Base, Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas

Document Path: G:\Wurtsmith\PFCs_775290218a_MXD\SI Report\Fig3.8-3WAFB_SI_Sed_Soil_Historical_Current_Data_9.mxd



NOTE:
- Units in miligrams per kilogram (mg/kg)
- Depth measured in feet
- J = The analyte was positively identified and the associated numerical value is the approximate concentrationof the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the reported limit of detection.
- No criteria for PFBS in sediment.

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Project: 775290177
By: AES
Date: 05/04/2017

N

0 175 350 700 Feet

SYMBOL KEY

- Soil Boring Sample
- Sediment Sample
- 2016 Sampling Results
- AFFF Area
- Former Wurtsmith AFB Installation Boundary
- Sanitary Sewer
- Estimated Groundwater Flow Direction
- Streams
- Surface Water

FIGURE 3.9-3
AFFF Area 11
PFAS with Applicable Criteria in Soil and Sediment
WWTP System
Former Wurtsmith Air Force Base, Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas

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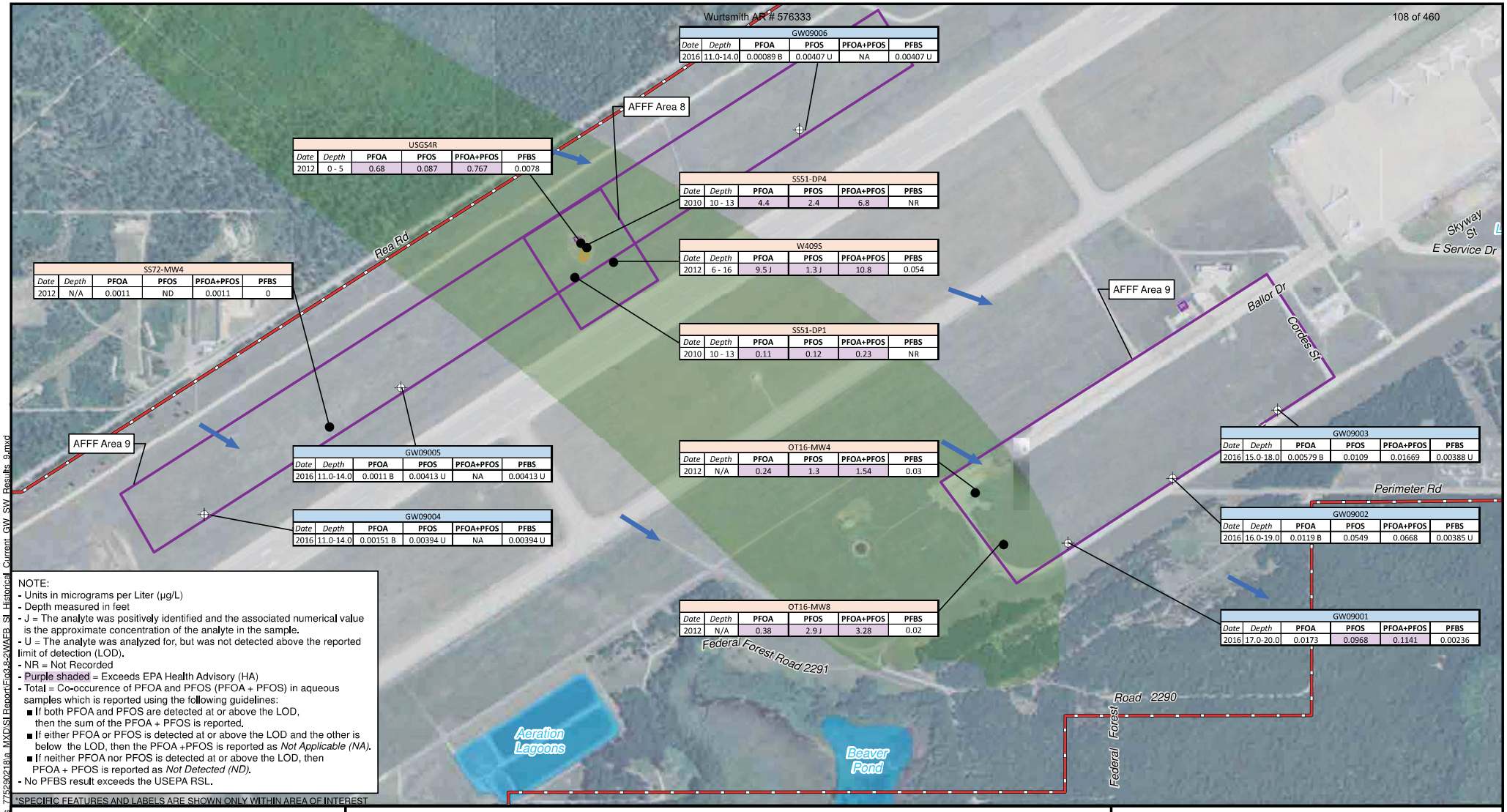

GW09006

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2016	11.0-14.0	0.00089 B	0.00407 U	NA	0.00407 U

USGS4R

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2012	0 - 5	0.68	0.087	0.767	0.0078

SS51-DP4

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2010	10 - 13	4.4	2.4	6.8	NR

W409S

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2012	6 - 16	9.5 J	1.3 J	10.8	0.054

SS72-MW4

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2012	N/A	0.0011	ND	0.0011	0

SS51-DP1

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2010	10 - 13	0.11	0.12	0.23	NR

GW09003

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2016	15.0-18.0	0.00579 B	0.0109	0.01669	0.00388 U

GW09005

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2016	11.0-14.0	0.0011 B	0.00413 U	NA	0.00413 U

OT16-MW4

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2012	N/A	0.24	1.3	1.54	0.03

GW09002

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2016	16.0-19.0	0.0119 B	0.0549	0.0668	0.00385 U

GW09004

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2016	11.0-14.0	0.00151 B	0.00394 U	NA	0.00394 U

OT16-MW8

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2012	N/A	0.38	2.9 J	3.28	0.02

GW09001

Date	Depth	PFOA	PFOS	PFOA+PFOS	PFBS
2016	17.0-20.0	0.0173	0.0968	0.1141	0.00236

NOTE:
- Units in micrograms per Liter (µg/L)
- Depth measured in feet
- J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the reported limit of detection (LOD).
- NR = Not Recorded
- Purple shaded = Exceeds EPA Health Advisory (HA)
- Total = Co-occurence of PFOA and PFOS (PFOA + PFOS) in aqueous samples which is reported using the following guidelines:
  - If both PFOA and PFOS are detected at or above the LOD, then the sum of the PFOA + PFOS is reported.
  - If either PFOA or PFOS is detected at or above the LOD and the other is below the LOD, then the PFOA +PFOS is reported as *Not Applicable (NA)*.
  - If neither PFOA nor PFOS is detected at or above the LOD, then PFOA + PFOS is reported as *Not Detected (ND)*.
- No PFBS result exceeds the USEPA RSL.

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Project: 775290177

By: AES | Date: 05/04/2017

0 300 600 1,200 Feet

SYMBOL KEY

- Direct Push Groundwater Sample
- Historical Sampling Location
- 2016 Sampling Results
- Historical Sampling Results
- AFFF Area
- Former Excavation Area
- Former Land Farm Plot
- Surface Water
- Former Wurtsmith AFB Installation Boundary
- Estimated Groundwater Flow Direction

PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
PFBS = Perfluorobutane sulfonate

FIGURE 3.8-2
AFFF Area 9
PFAS with Applicable Criteria in Groundwater
WWTP Drying Bed
Former Wurtsmith Air Force Base, Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas

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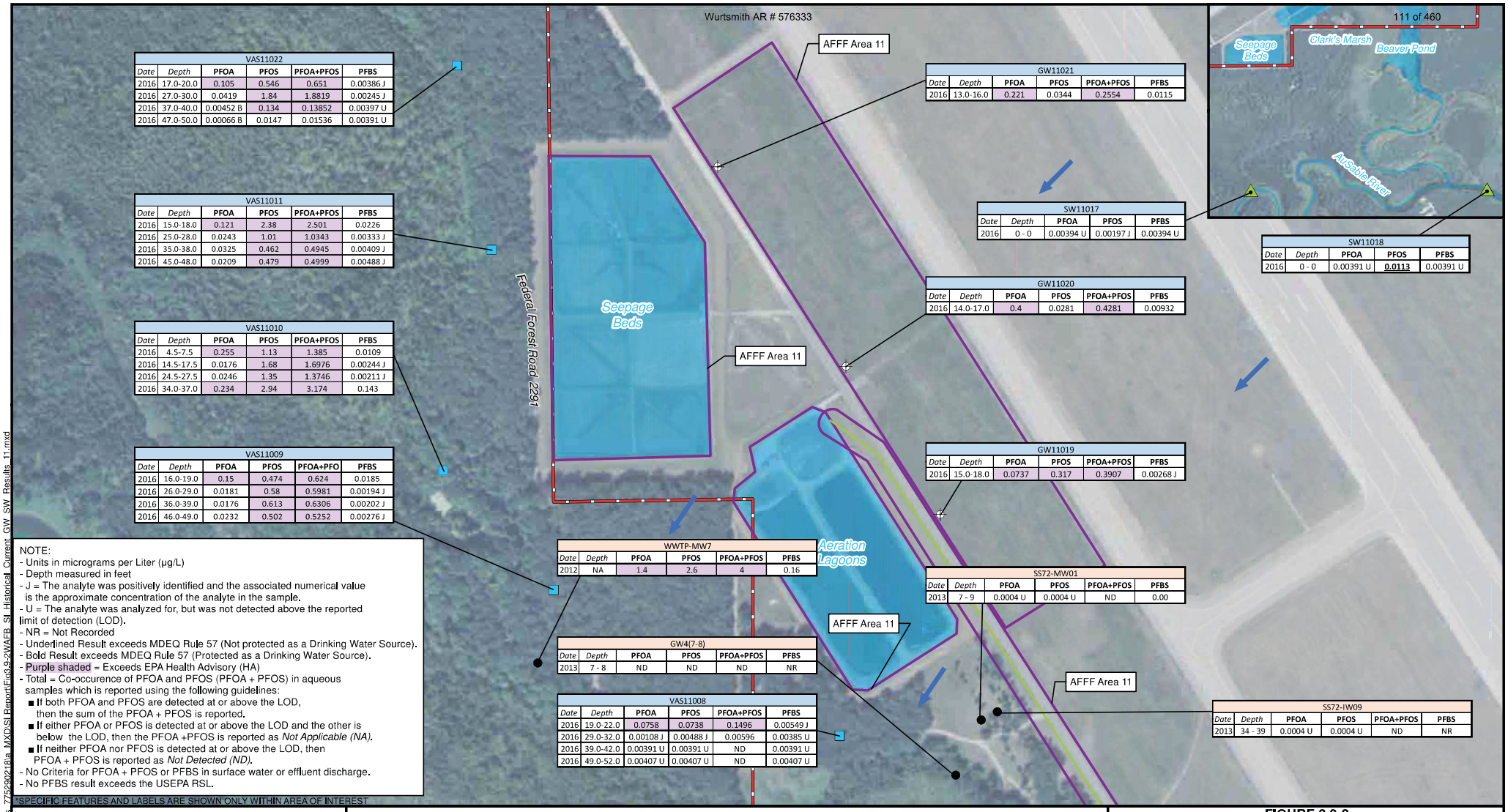

NOTE:
- Units in micrograms per Liter (µg/L)
- Depth measured in feet
- J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the reported limit of detection (LOD).
- NR = Not Recorded
- Underlined Result exceeds MDEQ Rule 57 (Not protected as a Drinking Water Source).
- Bold Result exceeds MDEQ Rule 57 (Protected as a Drinking Water Source).
- Purple shaded = Exceeds EPA Health Advisory (HA)
- Total = Co-occurence of PFOA and PFOS (PFOA + PFOS) in aqueous samples which is reported using the following guidelines:
  - If both PFOA and PFOS are detected at or above the LOD, then the sum of the PFOA + PFOS is reported.
  - If either PFOA or PFOS is detected at or above the LOD and the other is below the LOD, then the PFOA +PFOS is reported as *Not Applicable (NA)*.
  - If neither PFOA nor PFOS is detected at or above the LOD, then PFOA + PFOS is reported as *Not Detected (ND)*.
- No Criteria for PFOA + PFOS or PFBS in surface water or effluent discharge.
- No PFBS result exceeds the USEPA RSL.

*SPECIFIC FEATURES AND LABELS ARE SHOWN ONLY WITHIN AREA OF INTEREST

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Project: 775290177
By: AES | Date: 05/04/2017

0 175 350 700 Feet

SYMBOL KEY
- Direct Push Groundwater Sample
- Vertical Aquifer Sample
- Surface Water
- Historical Sample Location
- Historical Sampling Results
- 2016 Sampling Results
- AFFF Area
- Surface Water
- Former Wurtsmith AFB Installation Boundary
- Sanitary Sewer
- Estimated Groundwater Flow Direction

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PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
PFBS = Perfluorobutane sulfonate

FIGURE 3.9-2
AFFF Area 11
PFAS with Applicable Criteria in Groundwater and Surface Water
WWTP System
Former Wurtsmith Air Force Base, Oscoda, Michigan

Site Inspection Report for
Aqueous Film Forming Foam (AFFF) Areas

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

NOW THE
OFFICE OF LAND AND
EMERGENCY MANAGEMENT

AUG 2 3 2019

MEMORANDUM

SUBJECT: Use of Early Actions at Superfund National Priorities List Sites and Sites with Superfund Alternative Approach Agreements

FROM: for James E. Woolford, Director
Office of Superfund Remediation and Technology Innovation

TO: Superfund National Program Managers, Regions 1-10
Superfund Branch Chiefs, Region 1-10
Regional Superfund and Technology Liaisons, Regions 1-10
Regional Counsels, Region 1-10

PURPOSE

The purpose of this memorandum is to further the use of early actions at sites on the Superfund National Priorities List (NPL) and at sites with Superfund Alternative Approach (SAA) agreements consistent with the expectations in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).[1] Early actions include non-time-critical removal actions and early remedial actions (either interim or final) selected before completion of a remedial investigation (RI) and feasibility study (FS) for a given operable unit (OU). Such actions facilitate site cleanup by addressing immediate risks to human health and the environment or by controlling migration of contaminated media. Emergency or time-critical removal actions may also be appropriate as "early actions;" however, this memorandum does not address their use.

This memorandum also encourages the consideration of early action as part of an overall site strategy. The Superfund program has long encouraged the use of "strategic planning to identify the optimal set and sequence of actions necessary to address the site problems."[2] Such actions may include, as appropriate, early actions.

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[1] "Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup." NCP §300.430(a)(1)(ii)(A)

[2] Preamble to the NCP, 55 Fed. Reg. 8706, March 8, 1990

While this memorandum focuses on early actions (i.e., before RI/FS completion), we continue to support appropriate use of interim actions after RI/FS completion. The memo also encourages applying the principle of early action – taking actions at the point that sufficient information is available to support a response to mitigate risk or limit contaminant migration – to other remedial phases.

In its July 2017 report, the U.S. Environmental Protection Agency (EPA) Superfund Task Force recommended the use of early actions to improve and to accelerate the Superfund cleanup process.[3] Adaptive management[4] and smart scoping[5] are related and complementary practices to early actions.

This document does not substitute or supersede NCP regulations, and it is not a regulation itself. Thus, it does not impose legally binding requirements on EPA, states or the regulated community and may not apply to a specific situation. EPA decisions will be based on appropriate statutory and regulatory requirements, and EPA decision-makers retain the discretion to adopt differing approaches on a case-by-case basis.

BACKGROUND

Early actions are expected to achieve significant risk reduction,[6] to address immediate risks to human health and the environment,[7] or to control migration of contamination and are, by definition, selected before the RI/FS for the site or OU is completed.[8] Early actions can also support reuse of a portion of the site. An early action using remedial authority may be interim or final. For the purpose of this memorandum, a non-time critical removal action (NTCRA) would generally be considered an early action under removal authority.

To support an early remedial action (interim or final), the response decision should be documented with sufficient supporting information to demonstrate the potential for risk and the need to take action (the "basis for action").[9] The interim action generally should not preclude the implementation of the subsequent final action.[10] An interim or final record of decision (ROD) for an early remedial action typically uses data from a focused FS or an ongoing RI/FS. The ROD documents the problem warranting action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and concisely analyzes remedial alternatives. An

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[3] Superfund Task Force Recommendations, July 25, 2017 [https://semspub.epa.gov/src/document/HQ/100000339]
[4] Superfund Task Force Recommendation #3: Broaden the Use of Adaptive Management, OLEM 9200.3-120, July 3, 2018 [https://semspub.epa.gov/src/document/11/100001630]
[5] Smart Scoping for Environmental Investigations Technical Guide, November 2018 [https://semspub.epa.gov/src/document/11/100001799]
[6] NCP §300.430(a)(1)(ii)(A)
[7] NCP §300.415(b)(5)(i)
[8] USEPA, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, July 1999 [https://semspub.epa.gov/src/document/HQ/500009392]
[9] USEPA, Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions, April 22, 1991 [https://www.epa.gov/sites/production/files/2015-11/documents/baseline.pdf]
[10] NCP §300.430(a)(1)(ii)(B)

interim remedial action is typically followed by a final action that fully addresses the scope of the risks posed by the releases.[11]

EPA may also take early action using NTCRA authority. Under CERCLA, removal actions include:

> ...the cleanup or removal of released hazardous substances from the environment, such actions as may be necessary . . . in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.[12]

When a planning period of at least six months is available, an engineering evaluation/cost analysis (EE/CA) should be conducted[13] and authorized with an approval memorandum. The approval decision is documented in an action memorandum, which also explains how the NTCRA contributes to, or is at least consistent with, the permanent remedy. A NTCRA is typically followed by a final ROD at an NPL site and at sites with SAA agreements.

Remedial project managers (and on-scene coordinators, as appropriate) are encouraged to consider opportunities for early action as part of an overall sitewide cleanup strategy using the NCP's site management planning principles. [See Box. [14]] A sitewide cleanup strategy is a dynamic plan that guides overall prioritization for taking actions at a site. Actions are to be implemented as soon as site data and information make it possible to do so.[15] The strategy is developed at the beginning of the remedial process for each NPL site or site using SAA and updated to account for site progress, new information and changing site conditions. A sitewide cleanup strategy also ensures that OU remedies, including interim actions, are consistent with and support implementation of the expected final remedy. The Office of Superfund Remediation and Technology Innovation (OSRTI) plans to pilot a template for a sitewide cleanup strategy.

Site management planning is a dynamic, ongoing, and informal strategic planning effort that generally starts as soon as sites are proposed for inclusion on the NPL and continues through the RI/FS and remedy selection process and the remedial design and remedial action phases, to deletion from the NPL.

IMPLEMENTATION

To ensure that the Agency considers and implements, as appropriate, early actions at Superfund sites as part of the overall site cleanup approach, EPA remedial project managers (and on-scene

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[11] USEPA, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, July 1999 [https://semspub.epa.gov/src/document/HQ/500009392]
[12] CERCLA, as amended by SARA, §101(23)
[13] NCP §300.415(b)(4)
[14] Preamble to the NCP, 55 Fed. Reg. 8706, March 8, 1990
[15] NCP §300.415(a)(1)

coordinators, as appropriate) should include an evaluation of the opportunity for early action in: (1) the sitewide cleanup strategy; (2) adaptive management plans; and (3) smart scoping activities for both fund-lead and enforcement-lead RI/FSs.

In particular, EPA expects to consider early actions to provide expeditious risk reduction and limit contaminant migration. In general, these actions can be used to:

- Address current exposure (e.g., alternative water supplies, mitigation of vapor intrusion);
- Take advantage of an opportunity to significantly reduce risk and threats quickly (e.g., removing hot spots of contamination, drums and tanks);
- Prevent further migration of contamination (e.g., source remediation or hydraulic containment of a plume while a final groundwater remedy is developed); or
- Facilitate re-use or all or portions of the site by identifying and addressing related risks quickly.

Early actions are particularly advantageous for complex sites, such as sediment, mining and some groundwater sites, where EPA anticipates a lengthy timeframe for what is typically multiple RI/FS, RD and RAs. EPA also expects the appropriate use of interim actions and application of the principle of early action in other remedial phases. For example, during remedial design, response actions may be appropriate for certain media or areas, even while the overall design is ongoing.

EPA bases site-specific decisions concerning the use of removal or remedial authority on the NCP criteria, time sensitivity, complexity and cost (e.g., the statutory time and cost limitations on removal actions and the criteria for waiving those limitations; and availability of resources).[16] Early actions at enforcement-lead sites may use removal or remedial authority, as appropriate. For fund-financed NPL sites, early actions are usually implemented under remedial authority and documented in a ROD. While early actions may also be appropriate at federal facility sites, their usage should be consistent with authority provided the lead agency under CERCLA and Executive Order 12580, as well as CERCLA section 120 federal facility agreements.

NEXT STEPS

Regional offices are expected to evaluate opportunities for early actions as an element of sitewide planning activities. To support regional staff, OSRTI intends to draft a template for a sitewide cleanup strategy. OSRTI also plans to publish case studies and conduct webinars documenting successful early actions, as well as enhance training under the CERCLA Education Center.

If there are any questions concerning the use of early actions, please contact your regional coordinator in OSRTI and the Office of Site Remediation and Enforcement for private sites and in the Federal Facilities Restoration and Reuse Office for federal facilities.

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[16] Preamble to the NCP, 55 Fed. Reg. 8704, March 8, 1990

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