RES 071
Significant

Dane County Contract Cover Sheet

Dept./Division	Airport/Administration
Vendor Name	Mead & Hunt, Inc.
Vendor MUNIS #	5096
Brief Contract Title/Description	Addendum to On-Call Engineering Services Master Agreement, #13785 for remedial action to continue work to mitigate PFAS from stormwater into the Starkweather Creek
Contract Term	to 08/31/2024
Total Contract Amount	$ 800,000 (not to exceed)

Contract # (Admin will assign)	13785A
Addendum	☒ Yes ☐ No
Type of Contract	
☒	Dane County Contract
☐	Grant
☐	County Lessee
☐	County Lessor
☐	Intergovernmental
☐	Purchase of Property
☐	Property Sale
☐	Other

Purchasing Authority	☐ **$11,000 or under – Best Judgment** (1 quote required)
	☐ **Between $11,000 – $37,000 ($0 – $25,000 Public Works)** (3 quotes required)
	☐ **Over $37,000 ($25,000 Public Works)** (Formal RFB/RFP required) RFB/RFP #
	☐ **Bid Waiver – $37,000 or under** ($25,000 or under Public Works)
	☐ **Bid Waiver – Over $37,000** (N/A to Public Works)
	☐ **N/A – Grants, Leases, Intergovernmental, Property Purchase/Sale, Other**

MUNIS Req.		Org Code		Obj Code		Amount	$
Req #		Org Code		Obj Code		Amount	$
Year		Org Code		Obj Code		Amount	$

Resolution	**A resolution is required if the contract exceeds $100,000 ($40,000 Public Works). A copy of the Resolution must be attached to the contract cover sheet.**
	☐ Contract does not exceed $100,000 ($40,000 Public Works) – a resolution is not required.
	☒ Contract exceeds $100,000 ($40,000 Public Works) – resolution required. Res # 071
	☒ A copy of the Resolution is attached to the contract cover sheet. Year 2020

Contract Review/Approvals

Initials	Dept.	Date In	Date Out	Comments
MG	Received by DOA	6/8/20		
ch	Controller		6/8/20	approval via email
pp	Purchasing		6/8/20	approval via email
dg	Corporation Counsel		6/8/20	approval via email
dl	Risk Management		6/8/20	approval via email
	County Executive			

Dane County Dept. Contact Info		Vendor Contact Info	
Name	Kim Jones/Amy Tutweiler	Name	Chris Reis
Phone #	(608) 246-33	Phone #	(609) 273-6391
Email	jones.kimberly@msnairport.com	Email	
Address	4000 International Lane Madison, WI 53704	Address	2440 Deming Way Middleton, WI 53562-1562

Certification: The attached contract is a:	
☐	Dane County Contract without any modifications.
☒	Dane County Contract with modifications. **The modifications have been reviewed by:** Corp. Counsel, Assistant - Amy Tutweiler
☐	Non-standard contract.

Contract Cover Sheet Signature

Department Approval of Contract		
Dept. Head / Authorized Designee	**Signature** Kimberly Jones	**Date** 6/2/2020
	Printed Name Kimberly Jones, Airport Director	

Contracts Exceeding $100,000

Major Contracts Review – DCO Sect. 25.11(3)

Director of Administration	**Signature** Greg Brockmeyer	**Date** 6/8/20
	Comments	
Corporation Counsel	**Signature** David Gault	**Date** 6/8/20
	Comments	

Goldade, Michelle

From: Goldade, Michelle
Sent: Monday, June 8, 2020 1:36 PM
To: Hicklin, Charles; Patten (Purchasing), Peter; Gault, David; Lowndes, Daniel
Subject: Contract #13785A
Attachments: 13785A.pdf

Tracking:

Recipient	Read	Response
Hicklin, Charles		
Patten (Purchasing), Peter		Approve: 6/8/2020 2:00 PM
Gault, David	Read: 6/8/2020 2:26 PM	Approve: 6/8/2020 2:26 PM
Lowndes, Daniel		Approve: 6/8/2020 4:40 PM

Sorry…forgot the vote buttons! Let's try this one!

From: Goldade, Michelle
Sent: Monday, June 8, 2020 1:33 PM
To: Hicklin, Charles <Hicklin@countyofdane.com>; Patten (Purchasing), Peter <Patten.Peter@countyofdane.com>; Gault, David <Gault@countyofdane.com>; Lowndes, Daniel <Lowndes@countyofdane.com>
Cc: Stavn, Stephanie <Stavn@countyofdane.com>
Subject: Contract #13785A

Contract #13785A
Department: Airport
Vendor: Mead & Hunt Inc
Contract Description: Addendum for On-Call Engineering Services for remedial action to continue work to mitigate PFAS from stormwater in Starkweather Creek (Res 071)
Contract Term: 6/1/20 – 12/31/20
Contract Amount: $1,894,523

Please review the contract and indicate using the vote button above if you approve or disapprove of this contract.

Thanks much,
Michelle

Michelle Goldade
Administrative Assistant II
Dane County Department of Administration
Room 362, City-County Building
210 Martin Luther King, Jr. Boulevard
Madison, WI 53703
PH: 608/266-4941
Fax: 608/266-4425
TDD: Call WI Relay 711

Goldade, Michelle

From: Hicklin, Charles
Sent: Monday, June 8, 2020 1:36 PM
To: Goldade, Michelle
Subject: Approve: Contract #13785A

2020 RES-071

AUTHORIZING AN ADDENDUM TO THE AIRPORT ON-CALL ENGINEERING SERVICES AGREEMENT

In October 2019, through letters dated October 7 and 11, 2019, the Wisconsin Department of Natural Resources ("WDNR") identified the County as a party responsible for the investigation and remediation of perflouroalkyl substances (abbreviated "PFAS") found in the Dane County Regional Airport ("DCRA") stormwater system and nearby areas of Starkweather Creek. In the October 7 letter, WDNR named the County, City of Madison ("City") and Wisconsin Air National Guard ("WANG") as responsible parties for the creek contamination. WDNR directed the three parties to investigate and remediate the presence of PFAS contamination originating from two fire training areas located on county property and used by the City, WANG and others. In the October 11 letter, DNR identified the County as responsible for PFAS detected in the DCRA stormwater system and directed investigation and remediation of the contamination.

Through the October correspondence, WDNR directed the County and other parties to take several time-sensitive actions, including retaining a consultant within 30 days and evaluating interim actions and preparing an investigation work plan within 60 days. DCRA has an existing On-Call Engineering Services Contract with Mead & Hunt, Inc. DCRA requested Mead & Hunt's services in order to meet the DNR deadlines. Mead & Hunt successfully fulfilled the initial services WDNR required. These actions included developing work plans to investigate the stormwater system and the two fire training areas. Those work plans are attached to the proposed contract addendum as Exhibits 1 and 2. Mead & Hunt also evaluated options for interim remedial actions to mitigate the discharge of PFAS from the stormwater system into Starkweather Creek. It has completed the initial phase of the stormwater investigation plan. It is prepared to continue that investigation process and to implement the planned investigation of the fire training areas.

The County is currently in the process of issuing a Request for Proposal to retain a remediation contracting company to address the County's ongoing obligations to respond to the presence of PFAS contamination. That process is estimated to take three months. In order to continue to make progress toward remediating PFAS contamination, DCRA plans to have Mead & Hunt continue implementation of the current investigation work plans, including investigating past activities in the vicinity of DCRA that may be sources of observed PFAS in the environment. The Addendum to the On-Call Services Agreement provides the funding approval to proceed with that work.

NOW, THEREFORE BE IT RESOLVED that the Addendum to On-Call Engineering Services Agreement with Mead & Hunt, 2440 Deming Way, Madison, Wisconsin 53562-1562, is hereby approved.

BE IT FINALLY RESOLVED that the County Executive and County Clerk are authorized to sign the addendum agreement.

ADDENDUM TO DANE COUNTY CONTRACT # 13785A

THIS ADDENDUM TO ON-CALL ENGINEERING SERVICES AGREEMENT, made and entered into, by and between the County of Dane (hereafter referred to as "COUNTY") and Mead & Hunt, Inc. (hereafter, "PROVIDER") (hereafter "Addendum"),

WITNESSETH:

WHEREAS COUNTY and PROVIDER, by a separate document (hereinafter, the "Master Agreement"), Dane County Contract #13785, for On-Call engineering Services to the Dane County Regional Airport ("DCRA"), including environmental services, which expires August 31, 2024 (hereafter "Master Agreement");

WHEREAS, in October 2019, through letters dated October 7 and 11, 2019, the Wisconsin Department of Natural Resources (hereafter, "WDNR") identified the COUNTY as a party responsible for the investigation and remediation of perflouroalkyl substances (hereafter abbreviated "PFAS") found in the Dane County Regional Airport (hereafter, "the DCRA") stormwater system and nearby areas of Starkweather Creek;

WHEREAS through the October correspondence, WDNR directed the COUNTY to take several time-sensitive actions, including retaining a consultant within 30 days and evaluating interim actions and preparing an investigation work plan within 60 days;

WHEREAS PROVIDER successfully fulfilled on behalf of the COUNTY the initial services WDNR required in the October 2019 correspondence in accordance with the terms of Master Agreement, including locating an interim remediation service technology provider, and those services are ongoing;

WHEREAS the COUNTY is in the process of issuing a Request for Proposals to retain a remediation contracting company to address the COUNTY's ongoing obligations to respond to the presence of PFAS contamination on the DCRA property, which process is estimated to take three months;

WHEREAS, in order to continue to make progress toward remediating PFAS contamination, PROVIDER continues to implement the tasks set forth in the investigation work plans developed in response to the WDNR's October 2019 deadlines. As part of those work plans, PROVIDER is also investigating past activities in the vicinity of DCRA that may be sources of observed PFAS in the environment. PROVIDER's experience with DCRA, including its engineering and historical knowledge of the Airport's stormwater system and DCRA operations makes it uniquely capable to fulfill this task. A copy of the work plans are attached hereto as Exhibits 1 and 2;

WHEREAS the cost to complete the tasks in Exhibits 1 and 2 exceeds the amount approved for the Master Agreement. The additional amount shall not exceed $ 800,000.

NOW, THEREFORE, in consideration of the above premises and the mutual covenants of the parties hereinafter set forth, the receipt and sufficiency of which is acknowledged by each party for itself, COUNTY and PROVIDER do agree as follows:

I. **The Master Agreement shall remain in full force and effect unchanged in any manner by this addendum except as changes are expressly set forth herein. This addendum shall control only to the extent of any conflict between the terms of the Master Agreement and this addendum.**

II. **SERVICES:**

A. PROVIDER agrees to complete those tasks set forth in Exhibits 1 and 2 as described therein and other tasks associated with the PFAS contamination as requested by the Airport Director.

PROVIDER shall ensure that personnel providing services under this Addendum meet all applicable licensing requirements as well as the qualification requirements in Wis. Adm. Code Chapter NR 712. All laboratory services shall be provided by laboratories that are certified or registered under Ch. NR 149, Wis. Adm. Code or the U.S. EPA contract laboratory program.

B. PROVIDER shall ensure that all sub-consultants and subcontractors retained to carry out its obligations under this Addendum comply with all terms set forth in Master Agreement Sections VIII [Insurance], IX [No Waiver], X [Non-Discrimination], XI [Civil Rights Compliance], XII [Fair Labor Standards Compliance] and XIII [Federal Law Requirements] to the same extent required by PROVIDER.

III. **PAYMENT:**

PROVIDER shall submit to the COUNTY on a monthly basis invoices for all labor and materials provided under this Addendum. Invoices submitted hereunder shall be based on the billing and expense rates set forth in Schedule B of the Master Agreement attached to this Addendum and fully incorporated herein. Any additional billing and expense rates shall be included in proposed scopes of work. Bills for services shall not exceed $800,000. Any materials furnished shall be invoiced at cost without markup. COUNTY shall make payment to PROVIDER within 30 days of receipt and approval of each invoice.

IV. **REPORTS:**

PROVIDER shall provide reports and documentation as required by the WDNR rules, DNR staff and as requested by COUNTY.

IN WITNESS WHEREOF, COUNTY and PROVIDER, by their respective authorized agents, have caused this Agreement and its Schedules to be executed, effective as of the date by which all parties hereto have affixed their respective signatures, as indicated below.

FOR PROVIDER:

Christopher A Reis

May 21, 2020

Christopher Reis
Department Manager, Aviation Engineering

Date Signed

* * *

FOR COUNTY:

Joseph T. Parisi, Dane County Executive — Date Signed

Scott McDonell, Dane County Clerk — Date Signed

EXHIBIT 1

DANE COUNTY REGIONAL AIRPORT MADISON

Initial Site Investigation Work Plan for BRRTS Activity #02-13-583366

Plan prepared by

Mead & Hunt

meadhunt.com

In collaboration with

LimnoTech

limno.com

March 2020

Table of Contents

Tables

Figures

1.0 Introduction and Facility Information

Pursuant to the Wisconsin Department of Natural Resources (WDNR) October 7, 2019 letter referencing BRRTS Activity #02-13-584369, this work plan has been prepared to provide a description of activities being initiated at the Dane County Regional Airport (DCRA or the Airport) to initiate the investigation of reported and suspected per- and polyfluorinated alkyl substances (PFAS) contamination at the Airport. The purpose of this investigation is to evaluate the presence of PFAS in soils and groundwater at two closed firefighting training areas (referred to as Pearson Street/East and Darwin Street/West in this work plan), and inform additional investigation steps or remedial action, if warranted. This work plan has been developed to address elements required by and specified in Wisconsin Administrative Code NR 716.07 and 716.09. A description of the site is provided in **Section 1** and details of the proposed sampling and analysis strategy for this initial investigation are presented in **Section 3** of this plan.

This plan reflects the WDNR's February 19, 2020 comments on the Draft Work Plan, in which they noted that the BRRT Activity # 02-13-583366 should be used for the firefighting training areas investigations. Therefore, this work plan and all future work related to the two firefighting training areas will reference BRRT #02-13-58366. We respectfully request that WDNR close BRRTS #02-13-584369 issued on October 7, 2019 in deference to the older BRRTS number.

1.1. Site Name and Information

Site Name:	Dane County Regional Airport
Site Address:	4000 International Lane, Madison, Wisconsin 53704
Site Location:	All or parts of Sections 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, and 32 of Dane County Township 8N., Range 10E. See Appendix A for Airport Property Map.
Responsible Party or Parties:	Wisconsin Air National Guard (WANG), 3110 Mitchell Street, Building 1210, Madison, Wisconsin 53704-2529
	Dane County Regional Airport, 4000 International Lane, Madison, Wisconsin 53704
	City of Madison, 210 Martin Luther King Blvd., #403, Madison, Wisconsin 53703
Consultants Involved:	Mead & Hunt, 2440 Deming Way, Middleton, Wisconsin 53562-1562
	LimnoTech, 501 Avis Drive, Ann Arbor, MI 4108

A map showing the location and site layout of DCRA is shown in **Figure 1** and **Appendix A**.

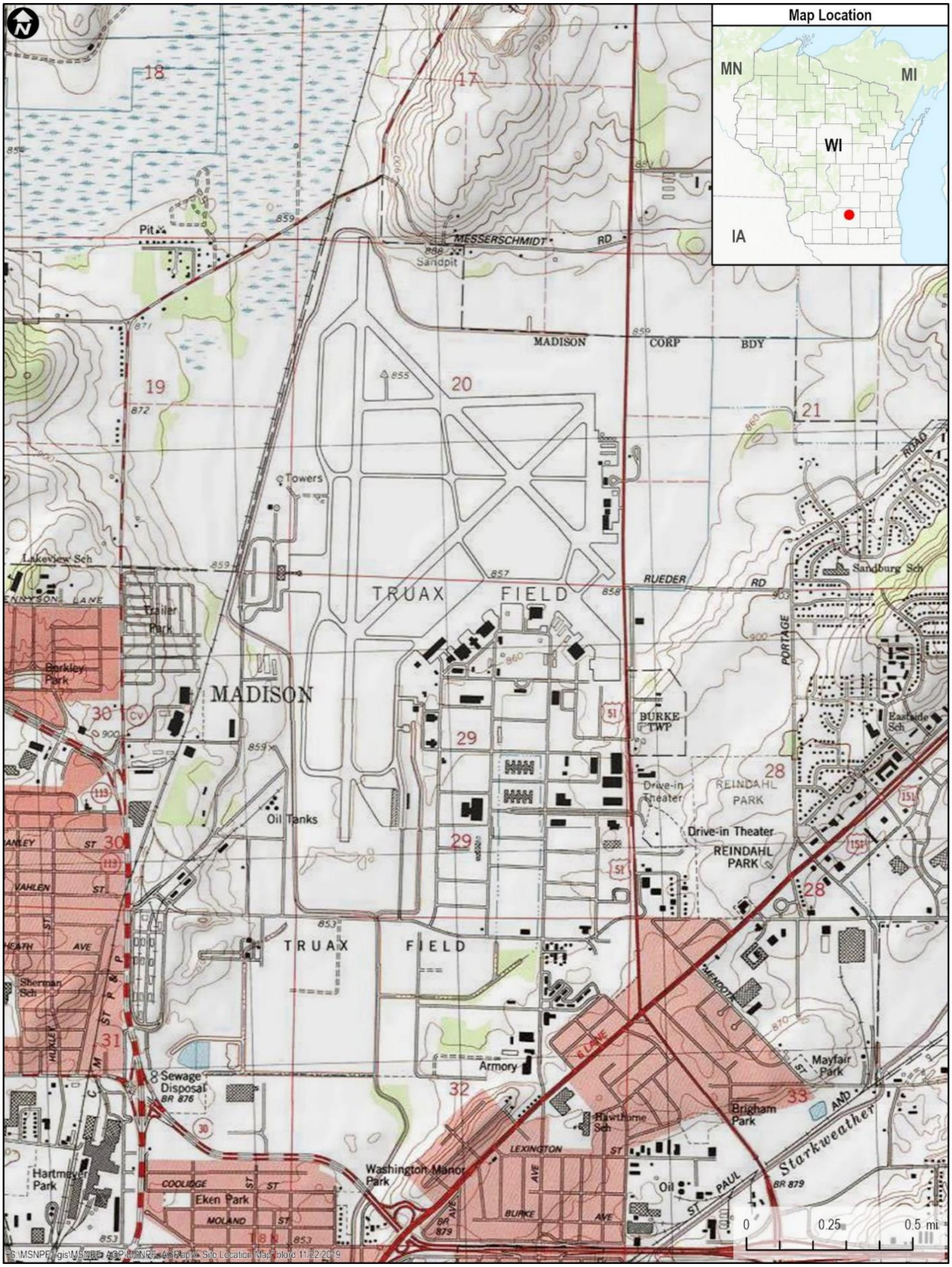


Figure 1. Topographic Quadrangle (DeForest Quad) Showing Location of DCRA.

1.2. Summary of Information Gathered During Scoping

Both firefighting training areas were evaluated in the past for petroleum-based contamination. Neither firefighting training area was evaluated for PFAS compounds during previous evaluations. Petroleum-based contamination was found and remediated at the Pearson Street/East Firefighting Training Area. No remediation was conducted at the Darwin Street/West Fire Training Area. Information on these firefighting training areas was limited in the Airport's records to the Final Engineering Report – Contamination Evaluation Truax Field[1] for the Darwin Street/West Firefighting Training Area and the Closure Report for Former Fire Training Pit Area[2] for the East Firefighting Training Area. The location of the Darwin Street/West and Pearson Street/East Firefighting Training Area where taken from these reports and are shown in Figure 2.

The Final Engineering Report – Contamination Evaluation Truax Field[1] for the Darwin Street/West Firefighting Training Area contained the following statements:

> "The fireman training area practice burn pit was probably created in the early 1950s by the DOD and was in use by DOD and numerous other organizations until December 1987."

PFAS compounds were not included in the sampling and analytical data collected for the evaluation of the Darwin Street/West Firefighting Training Area. Six soil and one groundwater locations were advanced and samples for BTEX, TPH, and inorganics analysis were collected.

A Closure Report for Former Fire Training Pit Area[2] , the Pearson Street/East Firefighting Training Area, was submitted to WDNR under Activity #02-13-231618 on 30 December 2003 by BT^2, Inc. A summary of this report indicates that 640 cubic yards of soils were removed and landfilled from the former Pearson Street/East Firefighting Training Area. Excavation was advanced to around 8 feet below ground surface (BGS), which was the depth of groundwater encounter. Analytical parameters were limited to diesel range organics (DRO), gasoline range organics (GRO), and petroleum volatile organic compounds (PVOCs) due to the presence of a UST north of the Pearson Street/East Firefighting Training Area.

PFAS compounds were also not included in the sampling and analytical data collected for the closure of the Pearson Street/East Firefighting Training Area. Soil and groundwater (both from permanent wells and piezometers) were sampled and analyzed for the aforementioned parameters. This report also included information on and sampling at the former UST area to the north.

Information from these sources have been used to prepare this work plan and will continue to be reviewed, along with the findings of the efforts described in this work plan, to inform appropriate future investigation activities.

1.3. Physiographic and Geological Setting Information

This section provides general physiographic and geological setting information as summarized in the Phase 1 Regional Site Inspection of Truax Field and other sources.

1.3.1. Topography

DCRA is located in south central Wisconsin, northeast of the city of Madison. The Airport is located at an elevation of approximately 890 feet above mean sea level and topography at the Airport is generally level. The Airport is within the Great Lakes Section of the Central Lowlands Physiographic Province, which is characterized by numerous lakes with associated lacustrine plains, prominent end moraines, and a still partially exposed cuestaform topography[1]. Lakes Mendota, Monona, and Waubesa are located to the southwest and south of the Airport.

1.3.2. Surface water drainage

Surface water drainage at the Airport is to Starkweather Creek, which flows around the Airport on the north, west, and south sides. Surface water flow at the Airport is conveyed by ditches, culverts, and storm sewers that outfall to Starkweather Creek. Starkweather Creek empties into Lake Monona approximately 2 miles to the south.

1.3.3. Geology

Information provided in the Phase 1 Regional Site Inspection of Truax Field include the following summary observations that we believe to be representative of the Airport. The geology and hydrogeology information will be field verified during the next steps investigation:

- Bedrock in the Central Lowlands Physiographic Province is primarily of Paleozoic age. There is also some bedrock of Cretaceous age underlying the western boundary of the province.
- Rock strata are generally flat to gently inclined, and the topographic effects of glaciation are common throughout the province.
- Structurally, regional dips are controlled by numerous domes and uplifts. With the exception of the southern border, the entire province is bordered by topography that is higher in elevation[2].
- Glacial deposits in southern Wisconsin range in thickness from a few feet to several hundred feet. Because the Airport is situated on a locally thick (approximately 300 feet) section of glacial drift, several geologic layers encountered elsewhere in the region do not occur beneath the Airport. There is an approximately 350-foot layer of Mt. Simon Sandstone bedrock beneath the glacial till underneath the Airport[3].

1.4. General hydrogeologic information

Information provided in the Phase 1 Regional Site Inspection of Truax Field includes the following summary observations that we believe to be representative of the Airport:

- Regionally, groundwater is found in the unconsolidated glacial deposits and underlying bedrock formations including sandstone of the Trempealeau Group, the deeper Tunnel City Group, and the underlying Elk Mound Group. These bedrock aquifers comprise the principal water supply aquifers in Dane County. The Mt. Simon Sandstone underlying the glacial deposits in the vicinity of the Airport is the lowermost formation of the Elk Mound Group.
- Based on information collected during 2017 investigation activities, monitoring wells within the water table zone indicate shallow groundwater flow is generally toward the south

[1] Envirodyne Engineers, Inc. 1989. Final Engineering Report – Contamination Evaluation Truax Field, Madison, Wisconsin under Contract DCRA 49-87-D-0003, Delivery No. 9, prepared for US Army Corps of Engineers.

[2] BT[2], Inc. 12003. Final Engineering Report – Contamination Evaluation Truax Field, Madison, Wisconsin under Contract DCRA 49-87-D-0003, Delivery No. 9, prepared for US Army Corps of Engineers.

[3] *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.

and southeast. The water table at the Airport is generally encountered at depths of 5 to 10 feet below ground surface, and groundwater flow gradients calculated from the investigations indicate groundwater flow velocities of 0.5 to 0.9 ft. per day.

- There are currently no known drinking water supply wells at the Airport, and the shallow groundwater system in the vicinity of the Airport is not used as a source of drinking water. Based on information obtained during the investigations, four private wells may have been located in the immediate vicinity of the Airport prior to initial construction activities in 1942; however, in light of the extensive development in the area, the four private wells are believed to be abandoned or not in use[4]. As part of the proposed investigation, additional records search will be conducted to verify this, if possible.

1.5. Potential migration pathways

Based on the initial review of information identified to date, potential migration pathways from DCRA may include stormwater discharge and groundwater flow. These potential migration pathways will be evaluated as part of this work plan.

Elements of this work plan are discussed in the following sections:

- 2 – Field Investigation and Sampling Plan
- 3 – Data Quality Objectives
- 4 – Quality Assurance/Quality Control
- 5 – Next Steps

[4] *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.

Figure 2. Location of Former Firefighting Training Areas at DCRA.

2. Field Investigation and Sampling Plan

As stated in Section 1 of this work plan, the objective of this investigation is to evaluate the presence of PFAS in soils and groundwater at the Pearson Street/East and Darwin Street/West Firefighting Training Area, and inform additional investigation steps or remedial action, if warranted. As such, the investigation described here is not intended to fully define the nature, extent, and distribution of PFAS, if present, in soil and/or groundwater.

2.1. Health and Safety

A project health and safety plan (HASP) will be prepared for subsurface investigation activities at the Airport. A copy of the HASP will be provided to each organization participating in field work, including subcontractors. All field personnel will have reviewed the site-specific HASP prepared for this investigation and will be aware of the chemical and physical hazards specific to this project. The HASP will be reviewed by all field personnel prior to initiating any field activities. In addition, all persons performing field investigative tasks for this project will have experience working on similar site investigation projects and will have completed OSHA 40-hour HAZWOPER safety training, with 8-hour refresher courses as needed. A copy of the HASP will remain onsite for the duration of field activities.

2.2. Investigation Overview

This preliminary investigation of the East and West firefighting training areas consists of the following components:

- Advancement of up to six (6) soil borings in the vicinity of each firefighting training area, for a total of ten (12) borings.
- Collection of up to two (2) soil samples from each boring for PFAS analysis, for a total of up to twenty (24) soil samples.
- Collection of one (1) groundwater sample from each boring, for a total of up to twelve (12) groundwater samples.

Installation of permanent monitoring wells is not planned as part of this preliminary investigation. Based on previous investigations at the WANG base, it is expected that groundwater will be encountered within five to ten feet below ground surface. Borings will be advanced until groundwater is encountered. Sampling locations are described in Section 2.3 and sampling methods are described in Section 2.4. Appendix A includes standard operating procedures (SOPs) for PFAS sampling, equipment cleaning, field documentation, soil sampling, and low flow groundwater sampling.

2.3. Sampling Locations

Six (6) direct-push soil borings are planned in the vicinity of each firefighting training area, as shown in Figures 3 and 4. Final boring locations may be adjusted in the field based on site conditions and/or utility clearance. Final boring locations will be determined in the field using GPS. The rationale for soil boring placement is that groundwater flow is generally in a southeasterly direction, based on previous investigation reports (AMEC Foster Wheeler, 2019), so the planned borings for the East Area and West Area are generally located on Figures 3 and 4, respectively, and area as follows:

- One boring will be located within each of the former firefighting training areas. The East Firefighting Training Area boring will include a soil sample at 1-2 feet bgs and at the water table due to past soil handling activities here.

- One or two borings will be located generally upgradient, approximately 20 to 30 feet north and northwest of each firefighting training area.
- One or two borings will be located immediately downgradient (southeast), within ten feet of each firefighting training area, if possible.
- Two borings will be located generally downgradient, approximately 20 to 30 feet south and southwest of each firefighting training area.

Table 1 contains a summary of the sampling quantities by area for this preliminary investigation. In total, this investigation likely will result in collecting 12 groundwater samples and up to 24 soil samples for laboratory analysis, plus quality assurance samples (duplicates, field blanks, equipment blanks) as described in Section 4.

Table 1. Sampling Summary for Preliminary Investigation

Location	Number of Soil Borings	Number of Soil Samples	Number of Groundwater Samples
Darwin Street/West Firefighting Training Area	6	Up to 12	6
Pearson Street/East Firefighting Training Area	6	Up to 12	6

Figure 3. Pearson Street/East Firefighting Training Area Sample Locations.

Figure 4. Darwin Street/West Firefighting Training Area Sample Locations.

2.4. Sampling Methods

All soil borings will be advanced using direct-push (e.g. Geoprobe) methods. Soil types encountered in each boring will be logged in the field by an experienced scientist or engineer. These borings will be advanced until the water table is encountered. All soil and groundwater samples will be collected by the LimnoTech geologist or engineer observing the boring.

Up to two (2) soil samples will be collected above the water table from each soil boring. The first soil sample will be collected from the uppermost foot of the soil boring, between ground surface and a depth of one foot below ground surface. The second soil sample will be collected from unsaturated soil within one foot of the water table. If extremely shallow groundwater or other conditions are encountered that indicate a second soil sample will yield redundant or otherwise unnecessary data, the second soil sample in each boring may be omitted based on the judgment of the geologist or engineer overseeing the boring. Soil sampling will be conducted in accordance with LimnoTech's SOP for soil sampling (attached), modified as necessary and appropriate by LimnoTech's SOP for PFAS sampling (attached).

Given the shallow depth to groundwater, groundwater samples will be collected using a peristaltic pump. Groundwater will be purged using the pump and conventional water quality parameters will be monitored by field personnel during purging to ensure that the groundwater sample is representative of the aquifer. Groundwater sampling will be conducted in accordance with LimnoTech's SOP for groundwater sampling (attached), modified as necessary and appropriate by LimnoTech's SOP for PFAS sampling (attached).

2.5. Analytical Parameters and Methods for Soil and Groundwater Samples

All soil and groundwater samples will be analyzed for PFAS by modified Method 537, unless an approved analytical method for PFAS is approved by the USEPA at the time of the investigation. The laboratory will be certified by the Department of Defense (DoD) to be compliant with Table B-15 of Quality Systems Manual (QSM), dated 2017, version 5.1 or later. Samples collected will be submitted to a certified, qualified laboratory for analysis. **Table 2** provides a summary of PFAS compounds to be analyzed and expected reporting limits

Table 2. Summary of DCRA Stormwater Sampling PFAS Analytical Parameters

Analyte Name	CAS#	Analyte	Aqueous QL (ng/l)	Soil QL (ng/g)
Perfluorobutanoic acid	375-22-4	PFBA	4.0	2.0
Perfluoropentanoic acid	2706-90-3	PFPeA	4.0	2.0
Perfluorobutanesulfonic acid	375-73-5	PFBS	4.0	2.0
Perfluorohexanoic acid	307-24-4	PFHxA	4.0	2.0
Perfluoroheptanoic acid	375-85-9	PFHpA	4.0	2.0
Perfluorohexanesulfonic acid	355-46-4	PFHxS	4.0	2.0
6:2 Fluorotelomer sulfonic acid	27619-97-2	6:2-FTS	4.0	2.0
Perfluorooctanoic acid	335-67-1	PFOA	4.0	2.0
Perfluoroheptanesulfonic acid	375-92-8	PFHpS	4.0	2.0
Perfluorooctanesulfonic acid	1763-23-1	PFOS	4.0	2.0
Perfluorononanoic acid	375-95-1	PFNA	4.0	2.0
Perfluorodecanoic acid	335-76-2	PFDA	4.0	2.0

Analyte Name	CAS#	Analyte	Aqueous QL (ng/l)	Soil QL (ng/g)
8:2 Fluorotelomer sulfonic acid	39108-34-4	8:2-FTS	4.0	2.0
Perfluorooctane sulfonamide	754-91-6	PFOSA	4.0	2.0
Perfluorodecanesulfonic acid	335-77-3	PFDS	4.0	2.0
Perfluoroundecanoic acid	2058-94-8	PFUnA/PFUdA	4.0	2.0
Perfluorododecanoic acid	307-55-1	PFDoA	4.0	2.0
N-methylperfluoro-1-octanesulfonamide	31506-32-8	MeFOSA	20	10
N-methylperfluoro-1-octanesulfonamido ethanol	24448-09-7	MeFOSE	20	10
Perfluorotridecanoic acid	72629-94-8	PFTrDA	4.0	2.0
N-ethylperfluoro-1-octanesulfonamide	4151-50-2	EtFOSA	20	10
N-ethylperfluoro-1-octanesulfonamido ethanol	1691-99-2	EtFOSE	20	10
Perfluorotetradecanoic acid	376-06-7	PFTeDA	4.0	2.0
Perfluorohexadecanoic acid	67905-19-5	PFHxDA	4.0	2.0
N-ethyl perfluorooctanesulfonamidoacetic acid	2991-50-6	EtFOSAA	8.0	2.0
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	MeFOSAA	8.0	2.0
Perfluorooctadecanoic acid	16517-11-6	PFODA	7.0	2.0
4:2 Fluorotelomer sulfonic acid	757124-72-4	4:2-FTS	4.0	2.0
Perfluoropentane sulfonic acid	2706-91-4	PFPeS	4.0	2.0
Perfluorononane sulfonic acid	68259-12-1	PFNS	4.0	2.0
Hexafluoropropylene oxide dimer acid	13252-13-6	HFPO-DA (GEN-X)	5.0	2.0
4,8-dioxa-3H-perfluorononanoic acid	919005-14-4	ADONA	4.0	2.0
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	756426-58-1	9Cl-PF3ONS	4.0	2.0
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9	11Cl-PF3OUdS	4.0	2.0
Perfluorododecane sulfonic acid	79780-39-5	PFDoS	5.0	4.0
10:2 Fluorotelomer sulfonic acid	120226-60-0	10:2 FTS	5.0	4.0

2.6. Field Documentation

All field activities will be documented by field personnel using the procedures described in LimnoTech's SOP for field documentation (**Appendix B**), modified as necessary for PFAS sampling by LimnoTech's SOP for PFAS sampling (**Appendix B**). Upon completion of investigation activities, field documentation will be stored with other project files at LimnoTech's office or at another location designated by the project manager. Further detail on field documentation is contained in Section 4.1.2.

2.7. Sample Documentation

Sample documentation includes assignment of a unique sample identification number at the time of sampling, which is subsequently used through the chain of custody to the final laboratory report.

2.7.1. Sample Identification

Samples will be designated with a unique identification that includes the boring or monitoring well identification number and, in the case of soil samples, the depth interval (in feet below ground surface) from which the sample is collected. The letters "SB" will be used to designate soil borings and "GW" will be used to designate groundwater samples. The letter "W" will be used in sample identification numbers for the Darwin Street/West Firefighting Training Area will include with and the letter "E" will be used in sample identification numbers for the Pearson Street/East Firefighting Training Area. The sample identification numbers will also include the digits "20" to represent the year. Example sample identification codes are given below:

Table 3. Sample Identification Examples

Sample Description	Sample Identification Number
Soil boring #1 from Darwin Street/West Firefighting Training Area	SBW20-01
Soil sample collected between 4 to 5 feet below ground surface from soil boring #1 at Darwin Street/West Firefighting Training Area	SBW20-01 (4-5)
Groundwater sample surface from soil boring #1 at Darwin Street/West Firefighting Training Area	SBW20-01-GW

This identification system will reduce the potential for confusion between sample results.

2.7.2. Chain of Custody

At the time of sampling, field sampling personnel will initiate a chain of custody (COC) using the COC form provided by the analytical laboratory. The COC is discussed in more detail in Section 4.1.3.

2.8. Investigation-Derived Waste

The investigation activities in this Work Plan are expected to generate the following types of investigation-derived waste (IDW):

- Used expendable materials related to sampling (e.g., nitrile gloves)
- Excess groundwater pumped during groundwater sampling
- Equipment decontamination water (municipal supply)
- Excess soil material generated during soil borings

Used expendable materials will be placed in sealed trash bags for disposal at a licensed solid waste facility. Environmental media (groundwater and soil) and decontamination water will be stored in drums at a secure location until they can be properly characterized for disposal.

3. Data Quality Objectives

Data quality objectives (DQOs) are quantitative and qualitative criteria intended to ensure that the data collected during the investigation are of an adequate level of quality for their intended uses.

3.1. Investigation Data Quality Objectives

The following specific DQOs have been identified for this investigation:

1. Analytical results for groundwater and soil samples must accurately represent actual groundwater and soil chemical quality.
2. Analytical results for groundwater and soil samples should be of sufficient quality to inform the conceptual site model and for comparison to regulatory criteria.
3. Analytical results must meet quality control requirements for accuracy, precision, completeness and comparability.

3.2. Data Quality Indicators

Data quality indicators (DQIs) are measures that are used to assess data quality and to verify that DQOs are met. The four DQIs (accuracy, precision, completeness and comparability) are discussed below.

3.2.1. Accuracy

Accuracy reflects the degree of bias in a measurement. To determine accuracy, a laboratory or field value is compared to a known or true concentration. Accuracy is determined by such QC indicators as: matrix spikes, surrogate spikes, laboratory control samples (blank spikes) and performance samples. Accuracy will be assessed using percent recovery, calculated as follows:

$\%R = 100 \times (A-B)/C$

Where:

%R = percent recovery

A = analyte concentration from spiked sample

B = analyte concentration from unspiked sample

C = analyte concentration of spike added

For this investigation, acceptable %R will be 80% - 120%.

3.2.2. Precision

Precision is a measure of the reproducibility of data measurements under similar conditions and is typically assessed by measuring the degree of mutual agreement between or among independent measurements of the same sample. The common measure of precision is the relative percent difference (RPD), calculated as follows:

$RPD = 100 \times (X1 - X2)/[(X1 + X2)/2]$

Where: X1 = original sample value

X2 = duplicate sample value.

RPD relates to the analysis of duplicate laboratory or field samples. Typically, field precision is assessed by co-located samples, field duplicates, or field splits and laboratory precision is assessed using laboratory duplicates, matrix spike duplicates, or laboratory control sample duplicates.

For this investigation target RPD limits will be 40%. RPDs will not be calculated if the observed concentration is less than five times the reporting limit in either the sample or field duplicate.

3.2.3.Completeness

Completeness measures the quantity of valid data obtained during the investigation, compared to the quantity of valid data expected. For this investigation, it is expected that all data will be valid. Completeness is calculated as follows:

Completeness = 100 x (number of valid samples obtained)/(number of samples collected)

The completeness goal for this investigation is 95%.

3.2.4.Comparability

Comparability expresses the confidence with which one data set can be compared to another. For this investigation, comparability will be assessed by documenting conformance to the work plan and noting any significant deviations. The data quality assurance review will also be considered in assessing data comparability. It should be noted that the current lack of a standardized methodology for the analysis of PFAS in soil and groundwater matrices must be considered when comparing data generated from different analytical laboratories.

4. Quality Assurance / Quality Control (QA/QC)

This section outlines the QA/QC measures that will be used during field monitoring activities.

4.1. Sample Handling and Custody

4.1.1. Field Sampling Custody

The objective of field sample custody is to assure that samples are traceable and are not tampered with between sample collection and receipt by the analytical laboratory. A person will have custody of a sample when the samples are:

- In their physical possession;
- In their view after being in their possession;
- In their personal possession and secured to prevent tampering; and
- In a restricted area accessible only to authorized personnel, and the person is one of the authorized personnel.

Field custody documentation will consist of both field log books and chain of custody forms.

4.1.2. Field Logbooks

Field logbooks serve as a daily record of events, observations, and measurements during field activities. All information pertinent to monitoring activities is recorded in the logbooks, and will include:

- Name and title of author
- Name(s) of field crew personnel
- Name of site and project code
- Description of sample location
- Number and volume of samples taken
- Date and time of collection
- Sample identification numbers
- Sampling method
- Preservatives used
- Field measurements (temperature, pH, etc.)
- Field observations (weather conditions, flow appearance, etc.)

4.1.3. Chain-of-Custody Forms

Completed chain-of-custody forms will be required for all samples to be analyzed. Chain-of-custody forms will be prepared by the field sampling crew during the daily sample collection events. The chain-of-custody form will contain the following information:

- Unique sample identification number
- Sample location
- Sample date and time

- Sample description
- Sample type
- Sample preservation
- Analyses required
- Sampling staff

The original chain-of-custody form will accompany the samples to the laboratory. The chain-of-custody forms will remain with the samples at all times and will be signed by a representative of the laboratory upon receipt of the samples.

4.2. Quality Control Requirements

4.2.1. Field Measurements

The accuracy of field measurements will be maintained through calibration of the field instruments according to manufacturer's specifications. Accuracy will be checked prior to the sampling event and following the sampling event and recorded in the field logbook.

4.2.2. Field Duplicates

Field duplicates (splits) will be collected and analyzed to check the precision or reproducibility of sampling and analytical procedures. Field duplicates are defined as two separate samples collected at a single location and time, labeled with separate identification codes so the laboratory cannot identify the samples as duplicates. Duplicate samples will be collected at the rate of approximately 10 percent. The duplicate samples will be handled and analyzed by the laboratory exactly the same as all other samples.

4.2.3. Field Blanks

Field blanks will be analyzed to check for chemical constituent infiltration and sample bottle contamination originating from sample transport and storage. A field blank will consist of analyte-free water poured into a sample bottle at the sample site and preserved according to the parameters to be analyzed. Field blanks will be collected at the rate of one per event.

4.2.4. Matrix Spike/Matrix Spike Duplicates

Laboratory quality control (QC) samples will analyzed as part of standard laboratory practice to monitor the precision and accuracy of its analytical procedures. These laboratory QC samples are referred to as matrix spike/matrix spike duplicate (MS/MSD) samples. The term "matrix" refers to use of the actual media collected in the field (e.g., routine soil and water samples). MS/MSD samples will be collected in the field and submitted to the laboratory with other samples. The DOD QSM specifies that MS/MSD samples be provided at a frequency of "one per preparatory batch" (QSM Table B-2), so the laboratory will specify the number of required MS/MSD samples based on their standard analytical batch size.

4.3. Special Precautions: PFC-Free Equipment, Supplies, Materials and Clothing

Special precautions shall be employed to minimize the possibility of sample cross-contamination related to the low PFAS detection limits and the widespread use of PFAS in consumer products and industrial processes, including:

- Conduct sampling beginning in areas of known or suspected lowest concentrations and progressing to areas of highest concentrations;

- Water used for equipment cleaning/rinsing will be sampled periodically to evaluate potential PFAS content;
- Sampling equipment and materials should be free of polytetrafluorethylene (PTFE), ethylene tetrafluoroethylene (ETFE), and fluorocarbon-based products (e.g., field filters, sample tubing, etc.); and
- Personal protective equipment, clothing, and hygiene products should be free of PFAS (e.g., fluoropolymer linings used on Tyvek, Nomex, and Viton materials, GoreTex linings, water resistant/waterproof/stain resistant treatments, sunblock, insect repellents, cosmetics/hand creams, food packaging protective of water and grease). All equipment, materials, supplies and clothing used during field activities must be PFC-free in accordance with the guidelines presented below.

LimnoTech's standard operating procedure for PFAS sampling is contained in **Appendix B**.

4.4. Data Assessment

QA review of all data will be conducted and documented before the data are reported in any way other than the original laboratory reports. Level IV QA/QC documentation reports will be requested for the soil and groundwater samples submitted as part of this investigation.

4.4.1. Laboratory Data Review and Validation

Laboratory QA review will be conducted in accordance with the laboratory Quality Assurance Plan (QAP). Upon receipt of the laboratory report for each sample batch, the project QA reviewer will verify that internal laboratory QA was conducted.

4.4.2. LimnoTech Data Review and Validation

When data are received from the analytical laboratory, they will be evaluated by the project QA reviewer to determine if they meet project requirements. Specific items to be reviewed during data validation are:

- Chain of custody completeness
- Holding times
- Duplicate analyses data
- Field and equipment blank data
- Precision and accuracy data
- Matrix spike and matrix spike duplicate data
- Surrogate standards (where applicable)
- Overall data assessment

The project QA reviewer will document the QA review of each data set in writing.

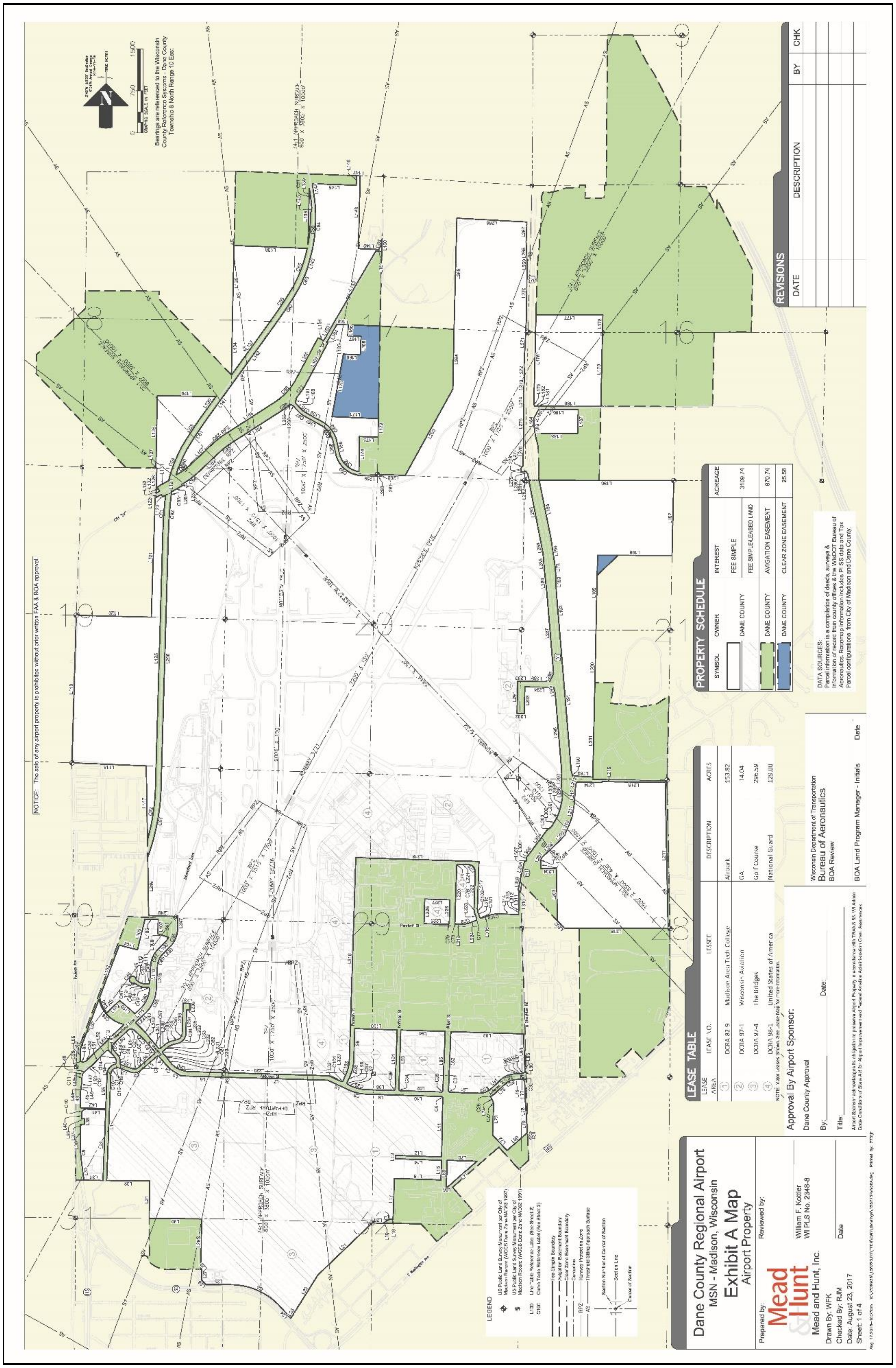
4.5. Anticipated Schedule and Reporting

It is expected that sampling at the firefighting training areas will be completed within one month of WDNR's plan approval, subject to the schedule availability of a qualified drilling contractor. A report summarizing the work completed and the sample results will be available within three weeks of final QA/QC data packages.

5. Next Steps

Any next steps will be determined by the results of the sampling efforts. This work plan included soil and groundwater sampling and analysis efforts at former firefighting training areas at the Airport.

APPENDIX A Airport Property Map


Dane County Regional Airport
MSN - Madison, Wisconsin
Exhibit A Map
Airport Property
PROPERTY SCHEDULE
LEASE TABLE
Approval By Airport Sponsor:
REVISIONS
DATE
DESCRIPTION
BY
CHK
Mead and Hunt, Inc.

APPENDIX B Standard Operating Procedures

I. INTRODUCTION

This standard operating procedure (SOP) is applicable to the collection of representative samples for analysis of per- and polyfluoroalkyl substances (PFAS; also referred to as and subsets of perfluorinated chemicals (PFCs)). The procedures described are intended to be applicable to most environmental media and sampling methods, although they were developed with an emphasis on water samples (e.g., drinking water, ground water, surface water). These typically applicable procedures have been adapted from a number of sources and may be varied or changed as required, dependent upon site conditions or equipment and procedural limitations, as long as the goal of collecting representative samples is maintained. The actual procedures used should be documented in the field notes, especially if changes are made. This SOP is designed to be used in conjunction with another SOP that describes the specific sampling methods for a specific environmental medium.

PFAS are a large group of chemicals used in many consumer, commercial, and industrial products and processes, and include water-, stain-, and oil-repelling coatings and fire-fighting foams. Some chemicals in this group (e.g., perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)) have been identified as persistent, bioaccumulative, and toxic chemicals. PFOS, PFOA, and their known precursors were largely phased out in the United States in the mid-2000s and early 2010s. Sample analytical reporting for PFAS analytes is usually at very low concentrations (parts per trillion, ppt), which can exacerbate problems with cross-contamination of samples.

There are two primary interferences or potential problems with representative sampling. These include cross contamination of samples and improper sample collection. Following proper decontamination procedures and minimizing disturbance of the sample site will minimize these problems as follows:

- Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment for each location. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to the Equipment Cleaning SOP.
- Conduct sampling beginning in areas of known or suspected lowest concentrations and progressing to areas of highest concentrations.
- Improper sample collection can involve using contaminated equipment, disturbance of stream or impoundment substrate, and sampling in an obviously disturbed area.

To collect a representative sample, the hydrology and morphometrics of a stream or impoundment should be determined prior to sampling. This will aid in determining the presence of phases or layers in lagoons or impoundments, flow patterns in streams, and appropriate sampling locations and depths. In addition, water quality indicator data may be collected, if necessary, in water bodies to determine if stratification is present. Measurements such as dissolved oxygen, pH, temperature, and redox potential can indicate if strata exist which would affect analytical results.

II. MATERIALS

A wide range of products commonly used in site investigations are known or suspected to contain PFAS. It is critical that the sampling program design consider as many sources of PFAS contamination as practicable to minimize cross contamination during a sampling event. All field equipment, supplies, materials and personnel clothing used during sampling operations shall be PFAS free as noted below and in Tables 1 and 2.

- All sampling, monitoring and drilling equipment (e.g., field filters, tubing, pumps, lubricants, packers, transducers, liners, O-rings, pipe-thread pastes, tapes, sealants, valves, and wiring) must be constructed of materials that are free from the following:
  a) Polytetrafluorethylene (PTFE), trademark Teflon®;
  b) Ethylene tetrafluoroethylene (ETFE), trademark Tefzel®;
  c) Polyvinylidene fluoride (PVDF), trademark Kynar®;
  d) Fluorinated ethylene propylene (FEP), trademark Neoflon®.
- Personal protective equipment, clothing, and hygiene products should be free of PFAS (e.g., fluoropolymer linings used on Tyvek, Nomex, and Viton materials, GoreTex linings, water resistant/waterproof/stain resistant treatments, sunblock, insect repellants, cosmetics/hand creams, food packaging protective of water and grease).
- Sample containers should be polypropylene or HDPE and/or as specified/provided by the laboratory; do not use glass to avoid analyte adsorption.
- Sample transfer to the laboratory should be conducted at 4°C ± 2°C or as specified by the laboratory using ice in double-bagged polyethylene plastic; do not use chemical- or gel-based cooling products.
- Use only laboratory-supplied PFAS-free water for preparation of field reagent blanks and equipment blanks.
- Water from any other sources, including public water supplies, used for any other purposes must be pre-determined to be PFAS-free.
- Deionized (DI) water will not be used to clean equipment due to the possible contamination from polytetrafluoroethylene material used in the DI water purification system.

III. PREPARATIONS

- Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
- Obtain the necessary sampling and monitoring equipment to suit the task. Consider sample volume, depth, deployment circumstances (shore, wading, boat, currents), type of sample, sampler composition materials, and analyses to be conducted.
- Decontaminate or pre-clean equipment and ensure that it is in working order.
- Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.
- Perform a general site survey prior to site entry, in accordance with the site-specific Health and Safety Plan.
- Use stakes, flagging, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.
- If collecting sediment or near-shore soil samples, develop procedures that will eliminate interferences with collection of representative water samples.
- The field team leader will work with field personnel to assure compliance with PFAS-free guidelines (see Table 1)

prior to commencement of field activities. Table 2 provides a list of prohibited and acceptable items for a PFAS field investigation. Daily compliance inspections will be conducted prior to beginning field activities. Corrective action will include removal of noncompliance items or workers from the site until in compliance.

IV. GENERAL SAMPLE COLLECTION PROCEDURES

1. Record pertinent data on the field log (see attached Surface Water Sampling Field Log, or equivalent).
2. Label all sample containers with the date, time, well number, site location, sampling personnel, and other requested information.
3. Don appropriate personal protective equipment (as required by the Health and Safety Plan).
   - Do not sample without powderless nitrile gloves.
4. Clean all sampling equipment prior to sample collection according to the procedures described in Section V.
5. Sample collection (see Tables 1 and 2 for complete lists of acceptable and unacceptable attire, materials, etc.):
   - The sample cap should never be placed directly on the ground during sampling.
   - Markers (Sharpie® or otherwise) are to be avoided.
   - Bottles should only be opened immediately prior to sampling.
   - Dust and fibers must be kept out of sample bottles.
   - Ballpoint pens may be used to label sample containers.
   - Samples should be double bagged using resealable low-density polyethylene (LDPE) bags (e.g. Ziploc®.
   - If possible, collect PFAS samples prior to collecting samples for other, non-PFAS analytes (e.g., VOCs) or field parameters (temperature, pH, etc.).
6. For samples requiring field filtering, use the appropriate PFAS-free equipment and, if possible, collect the sample directly into the sample container.
7. If field preservation is required (see SAP and/or QAPP), place appropriate preservative into the sample container prior to sample collection. Note the preservative used on the sample container and sampling log.
8. Quality control samples are normally specified and described (i.e., collection procedures, frequencies) in the work plans (SAP and/or QAPP), and for PFAS sampling they may include trip blanks, field reagent blanks, field equipment blanks, field duplicate samples, and matrix spike/matrix spike duplicate samples. These samples should be collected in the following manner:
   - Trip blanks should be prepared by the laboratory using PFAS-free water at the time sample bottle ware is prepared for delivery to the field. Trip blank containers shall be of the same type of sample container as those used for investigative samples collected for PFAS analysis. A

laboratory-supplied trip blank (comprised of the same sample containers, containing the same reagents, preservatives and other consumables used for investigative PFAS analysis) shall be placed in the environmental sample cooler immediately after the first sample collected for PFAS analysis is placed in the cooler. Trip blank samples shall be given a sample date and time of when the trip blank is placed in the environmental sample cooler. Trip blank samples shall accompany investigatory sample containers collected for PFAS analysis from collection, during the duration of the sample event, and during shipment to the laboratory. At no time after preparation and prior to arriving at the laboratory shall trip blanks be opened.

- ♦ Field reagent blanks should be collected using two appropriate laboratory-supplied containers (one containing PFAS-free water and the other empty). During the sampling event, field personnel transfer the preserved PFAS-free water from one container into the other container, screw on the laboratory-supplied caps, and place the sample containers into the cooler for submittal with the samples collected that day.
- ♦ Field equipment or rinse blanks should be collected by pouring PFAS-free water through/over the decontaminated sampling device into the sample container in the field, preserved and shipped to the laboratory with the field samples. Generally, equipment blanks are only collected if reusable sampling equipment is employed.
- ♦ Field duplicate samples should be collected into two distinct sample containers at the same time or immediately following one another in accordance with procedures described in the SAP or QAPP. Each sample of a field duplicate pair employs the same type of sample container, preservatives and other additives used. If blind duplicate samples are specified, one of the duplicate samples should be labelled so that it does not identify the other sample of the duplicate pair to the laboratory. For example, one sample of the duplicate pair would be labelled following the normal protocol, while the second would be labelled with a sample ID of “DUPLICATE” and a blank line placed in the location, date and time boxes of the sample label. It is important that the duplicate pair samples are identified separately in the field notes with information including location, sample ID (as entered on the sample container label and COC), sample date and time so that analytical results can be paired after received from the laboratory.
- ♦ Matrix spike (MS) and matrix spike duplicate (MSD) samples include two additional volumes of sample material collected in the field at the same time as an investigative sample (similar to field duplicate sampling), or may be collected by the laboratory from an existing investigative sample submitted from the field.

9. Record sample collection information on the field log and store the samples in an iced cooler according to the PFAS-free guidelines described herein and in the

Standard Operating Procedure for the Shipping and Handling of Samples.

10. Handle, pack, and ship samples according to the PFAS-free guidelines described herein and in Standard Operating Procedure for the Shipping and Handling of Samples.
    - Do not use chemical or blue ice.
    - Refresh with regular ice double bagged in Ziploc® bags
    - Chain of Custody should be bagged in Ziploc® storage bags and taped to the inside of the cooler lid.
    - The cooler should be taped closed with a custody seal and shipped by overnight courier.

V. EQUIPMENT DECONTAMINATION

Field sampling equipment used multiple times can become contaminated with PFAS. Decontamination procedures should be implemented to prevent cross-contamination.

The following procedures must be followed:

- Do not use Decon 90®
- Laboratory supplied PFAS-free water is preferred for decontamination.
- Water from any other sources, including public water supplies, used for any other purposes must be pre-determined to be PFAS-free.
- Deionized (DI) water will not be used to clean equipment due to the possible contamination from polytetrafluoroethylene material used in the DI water purification system.
- Alconox®, Liquinox® and Citranox® can be used for equipment decontamination.
- Sampling equipment can be scrubbed using a polyethylene or PVC brush to remove particulates.
- Decontaminated sampling equipment should be triple rinsed using PFAS-free water.

VI. EQUIPMENT-SPECIFIC SAMPLE COLLECTION PROCEDURES

See appropriate equipment- and medium-specific sample collection SOP and/or sampling equipment operation manual, as specified in the SAP or QAPP.

Table 1. PFAS-Free Guidelines.

PFAS-Free Guidelines (source: USEPA, DoD and ITRC)
Field Clothing and PPE: (see reference at bottom for acceptable products)
No clothing or boots containing Gore-Tex™
All safety boots made from polyurethane and PVC
No materials containing Tyvek®
Field crew has not used fabric softener on clothing
Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
Field crew has not applied unauthorized sunscreen or insect repellant
Field Equipment:
No Teflon® or LDPE containing materials on-site
All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene
No waterproof field books on-site
No plastic clipboards, binders, or spiral hard cover notebooks on-site
No adhesives (Post-It Notes) on-site
No Sharpies and permanent markers allowed; regular ball point pens are acceptable
No aluminum foil allowed
Keep PFAS samples in separate cooler, away from sampling containers that may contain PFAS
Coolers filled with regular ice only. No chemical (blue) ice packs in possession
Sample Containers:
All sample containers made of HDPE or polypropylene
Caps are unlined and made of HDPE or polypropylene
Wet Weather Gear:
Wet weather gear made of polyurethane and PVC only
Equipment Decontamination:
"PFC-free" water on-site for decontamination of sample equipment. No other water sources to be used.
Only Alconox and Liquinox to be used as decontamination materials
Food Considerations:
No food or drink on-site with exception of bottled water and/or hydration drinks (e.g., Gatorade, Powerade) that is available for consumption only in the staging area
Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

Table 2. Prohibited and Acceptable Items for Perfluorinated Compound (PFC) Field Investigations.

PPE, Clothing, Hygiene Products	PFC Concerns	Approved Alternative
Steel-toed boots	Boots may not contain Gore-Tex. Many waterproof boots are lined with Gore-Tex and are prohibited.	Steel-toed boots made with polyurethane and polyvinyl chloride (PVC)
Clothing	Water resistant, waterproof, or stain-treated clothing should be avoided. (EDQW 2016)	Clothing made of synthetic or natural fibers should be worn. Non-new cotton is preferred. Field gear should be laundered a minimum of six times prior to use, avoiding use of fabric softeners. Cotton overalls may be provided for use.
Rain Gear	Most rain gear is coated with a Gore-Tex lining and contains fluoropolymers.	Rain gear made from polyurethane and wax-coated materials may be worn (U.S. Navy 2015; EDWQ 2016).
Gloves	Nitrile gloves are specified for use in EPA Method 537.	Only nitrile gloves should be used. These should be changed often as outlined in EDQW 2016. Recommended powderless nitrile gloves.
Protective clothing	Fluoropolymer linings are used on Tyvek, Nomex, and Viton materials (U.S. Navy 2015; EDWQ 2016)	Avoid these materials. Select alternative protective clothing that does not contain fluoropolymers.
Sunblock and insect repellant	Many manufactured sun blocks and repellants contain PFCs.	Avoid use. If necessary, use of a 100% natural ingredient product may be used upon approval.
Cosmetics, moisturizers, hand creams, etc.	Many of these products contain surfactants and represent a potential source for PFCs.	Use of these products should be avoided prior to a sampling event. Acceptable products may include: ***Sunscreens*** - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are “free” or “natural” ***Insect Repellents*** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics ***Sunscreen and insect repellant*** - Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Food and drink	Food packaging often contains PFCs as a protectant from water and grease.	No food or drink shall be brought on-site, except for bottled water and hydration drinks. No blue ice packs should be used. Additionally, hands should be thoroughly washed following consumption of any wrapped fast food or pizza.

General Sampling Equipment and Field Supplies	Approved Alternative
Standard decontamination water or municipal water	Water from a known source that has been analyzed for PFCs and has been determined to be acceptable for the specific sampling program.
Decon 90 detergent	Alconox and Liquinox are the only detergents approved for decontamination (EDQW 2016)
Glass or Teflon-lined sampling bottles and lids	Polypropylene or high-density polyethylene (HDPE) sample bottles with an unlined polypropylene HDPE screw cap
Fluoropolymer tubing, valves, and other parts in pumps	HDPE and silicon materials (EDQW 2016)
Teflon tubing, bailers, tape, and plumbing paste	HDPE and silicon materials or disposable equipment
Pumps, packers, transducers, tubing, liners, valves, and wiring with polytetrafluorethylene or ethylene tetrafluoroethylene	Alternative materials
LDPE HydraSleeves	HDPE HydraSleeves (EDQW 2016)
Aluminum foil	Thin HDPE sheeting
Markers and waterproof pens	Non-waterproof pens (EDQW 2016)
Rite-in-the-rain paper, binders, and plastic clipboards	All field paperwork should be printed on standard paper and placed in a non-water-resistant folder or aluminum clipboard (EDQW 2016)
Post-It Notes	No Post-It Notes should be brought to the site
Chemical (blue) ice packs	Only regular ice should be used for refrigeration on site (EDQW 2016)

Table 2 References

Source Document - Groundwater and PFAS: State of Knowledge and Practice, Section 5: Field Sampling and Analysis, National Groundwater Association Press, 2017 – Draft Copy Not NGWA Board-approved, Not for circulation.

EDQW 2016. Bottle Selection and Other Sampling Considerations When Sampling for Per- and Poly-Fluoroalkyl Substances (PFAS). Revision 1.1.

U.S. Navy 2015a. Perfluorinated Compounds (PFCs) Interim Guidance/Frequently Asked Questions (FAQs). Memorandum from Commander, Naval Facilities Engineering Command, January 29, 2015.

U.S. Navy 2015b. Bureau of Medicine and Surgery, 2015. Testing for Perfluorochemicals (PFCs) in Drinking Water. Memorandum for Commander, Navy Medicine East.

SAMPLE COLLECTION FIELD LOG

Project Name:________________Project Code:___________Page __ of __

Date	Time	Sample ID	Sample Location	Equipment Used	Samplers	Comments (sample volumes, preservatives, descriptions, weather conditions, other observations, etc.)

Notes:

I. INTRODUCTION

Equipment cleaning areas will be located within or adjacent to a specific work area or as specified in the Health and Safety Plan. The equipment cleaning procedures described in this document include pre-field, in-field, and post-field cleaning of sampling equipment. The sampling equipment consists of soil sampling devices, well construction materials, ground-water sampling devices, water testing instruments, and other activity-specific sampling equipment. All non-disposable sampling equipment will be cleaned after completion of each sampling event. If appropriate, cleaning procedures will be monitored through the analysis of rinse blank samples as described in the project work plan or QAPP. **NOTE: If field activities involve per- and polyfluoroalkyl substances (PFASs) such as PFOS or PFOA, refer to the PFAS sampling SOP for additional measures which supersede this SOP.**

II. MATERIALS

The following materials will be available during equipment cleaning, as needed:

- Personal protection equipment (as required in the Health and Safety Plan);
- Distilled/de-ionized water;
- Non-phosphate detergent (Alconox, Liquinox, or equivalent);
- Tap water;
- Appropriate cleaning solvent (e.g., methanol, hexane, nitric acid);
- High-pressure hot water/steam cleaning unit;
- Wash basins;
- Brushes;
- Polyethylene sheeting;
- Aluminum foil;
- Plastic overpack drum, storage tub, or other suitable storage unit (for bladder or other pumps);
- Large heavy-duty garbage bags;
- Spray bottles (to hold tap water, distilled/de-ionized water, methanol, hexane, or nitric acid); and
- Disposable and/or heavy-duty reusable (PVC, latex or nitrile) gloves.

III. STORAGE OF EQUIPMENT

All cleaned sampling equipment will be stored in a clean environment and, where appropriate, the equipment will be covered/sealed with aluminum foil.

IV. SAFETY PROCEDURES DURING EQUIPMENT CLEANING

1. Personnel will wear the following personal protection equipment at a minimum, when cleaning sampling equipment (e.g., split-spoon sampler, trowels) and larger equipment (e.g., drill rig, augers):

- Safety glasses, goggles, or a splash shield; and
- PVC, latex, or nitrile outer gloves,
- Coated Tyvek® or Saranex® disposable coveralls or rain suit, optional for small equipment cleaning; and
- Chemical resistant over boots, optional for small equipment cleaning.

2. All solvent rinsing if required, will be conducted in an adequately ventilated area.
3. All solvents transported into the field will be stored and packaged in appropriate containers with care taken to avoid exposure to extreme heat.
4. Handling of solvents will be consistent with the manufacturer's Material Safety Data Sheets (MSDS).

V. FIELD CLEANING PROCEDURES

A. Cleaning Station

A designated field equipment cleaning station location will be established to conduct all cleaning at each work area of the Site. The field equipment cleaning station will be located away from the immediate work area to minimize adverse impacts from work activities on the cleaning procedures, but close enough so the sampling teams can minimize equipment handling and transport. All heavy equipment such as drill rigs and backhoes will receive an initial cleaning prior to use at the Site and will be cleaned again before leaving the site. The frequency of any additional cleaning will depend on the amount of use the heavy equipment receives and the extent of exposure to dirt and contaminants during the sampling event.

B. Cleaning of Smaller Sampling Equipment

Cleaning of smaller sampling equipment (e.g., split-spoon samplers, bailers, trowels) will be conducted according to the following sequential procedure:

- Non-phosphate detergent (Alconox, Liquinox, or equivalent) and tap water wash;
- Tap water rinse;
- Solvent rinse, if required (e.g., methanol or hexane for organic constituent analysis, nitric acid for inorganic constituent analysis); and
- Triple distilled/de-ionized water rinse.

The first step in decontamination is physical removal, where gross contaminants such as dust, soils and sediments can be removed through physical means such as wiping, scraping, shaking, and in some cases steam cleaning. Non-phosphate detergent and tap water scrub is intended to remove all visible particulate matter, residual oil and grease, and most but not all contaminants. Surfactants or detergents accumulate at the water to gas, solid, and oils interface, break the adhesive forces between the contaminant and the surface being cleaned, making the contaminants more soluble, allowing the contaminants to be washed away. The tap water rinse is necessary to remove all soapy residues and wash away loosened contaminants. The need for a specific solvent used for the solvent rinse, if required in the work plan or QAPP, will depend upon what the sample will be analyzed for and what contaminants are expected to be present. Some contaminants such as PCBs adhere to surfaces so tightly that a methanol or hexane rinse is required to break the adhesive bonds and adequately decontaminate the sampling equipment. Caution should be used when using solvent rinses to make sure that the chosen solvent is compatible with the sampling equipment and any PPE it will be used upon. It should be noted that most PPE constructed of organic materials could be damaged or dissolved by organic solvents such as alcohols, ethers, ketones, aromatics, straight chain alkanes and common petroleum products. The final rinse of distilled/de-ionized water will be repeated three times. Rinsing removes any remaining contaminants through dilution, physical attraction, and solubilization. The equipment will then be allowed to air dry.

C. Cleaning of Submersible Pumps

Submersible pumps may be used to evacuate stagnant groundwater from the well casing (e.g., air lift or turbine pumps) or to collect samples (e.g., bladder pump). The pumps will be cleaned and flushed between wells using an external detergent wash and tap water rinse. Steam cleaning may be substituted for pump casing, hose, and cables followed by a flushing with potable water through the pump and tubing or discharge hose. The cleaning process for development and purge pumps can be performed by pumping potable water from a clean plastic over-pack, drum or storage tub until a sufficient amount of water has been flushed through the system. The decontamination process for sampling pumps will consist of filling each of three clean suitable decontamination units sequentially with detergent water, tap water, and distilled/de-ionized water. Placing the sampling pump into each respective decontamination unit and pumping sufficient liquid from each unit through the sampling pump chamber and tubing if appropriate, to flush out any contaminants. It is recommended that disposable tubing be used whenever possible, thus reducing the amount of equipment and time needed for decontamination. In some cases, the chosen sampling pump (e.g. QED Micro Purge bladder pump) can easily be disassembled, decontaminated as individual small parts, disposable parts such as bladders and grab plates replaced and them reassembled for use. Such a pump, if appropriate for your sampling situation, would save time when cleaning and provide a more thorough decontamination, since all surfaces of the pump in which sample water has contact can be inspected, cleaned or replaced. If electric power pumps are used, care should be taken to avoid contact with the pump, well casing, pump reel and sample or purge water in direct contact with the pump, while the pump is running to avoid electric shock.

D. Cleaning of Heavy Equipment

Other equipment and materials, such as drill rigs, well casings, tools, and auger flights, associated with sampling events, will be cleaned prior to use. This equipment may retain chemical constituents from sources unrelated to the sampling site such as roadways, storage areas, or material from previous job sites that were not adequately removed. Heavy equipment will be thoroughly steam cleaned and/or manually scrubbed and rinsed upon arrival on site and when moved between sampling locations, as necessary. Drill rig items such as auger flights, wrenches, drill rods, and drill bits will also be cleaned before changing sample locations.

E. Collection and Disposal of used Solvents, Residuals and Rinse Solutions

All solvents, residuals, and rinse waters generated during the cleaning of equipment on-site will be collected, containerized, and stored on-site until arrangements can be made for proper disposal.

I. INTRODUCTION

Documentation of observations, conditions and generated data during field activities is an accepted scientific procedure and a critical component of any investigation. The rigorous documentation methods described in this SOP may be changed, as necessary, depending upon the needs of any particular investigation. Review the project work plans for any specific field documentation guidance. If changes are made to this SOP, document those changes in the field notes.

II. Methodology

- Use a new bound logbook for each project.
- Label logbook cover and binding with project name and code. Label inside cover with site information (name, address, contact(s), phone numbers, etc.). This will serve as a reference when performing fieldwork.
- Number each page of the logbook sequentially.
- All entries must be made in indelible ink (black is preferred because it copies well).
- All corrections or changes should be initialized, dated and marked with a circled error code. Any mistakes should be drawn through with a single line. Commonly error codes that may be used include: RE Recording Error, CE Calculation Error, SE Spelling Error, CL Changed for Clarity, WO Write Over.
- All entries should be accurate, factual, and unbiased. Never record an opinion.
- Notes should be detailed but concise.
- Notes should be written such that the day's activities can be reconstructed at a later date.
- Date the beginning of each day's notes.
- Use the 24-hour time format throughout the notes.
- Complete each day's notes with your signature.
- Maximize use of each line, crossing out gaps and blank pages so notes cannot be altered.
- Reference in the logbook when using other forms (e.g., boring logs, sampling forms, etc.).
- Return logbook to project manager upon completion of fieldwork.

III. Materials

The materials required for this SOP include the following:

- Bound field logbook(s).
- Field forms.
- Black waterproof/indelible ink pen(s).

IV. Items to include in a logbook

Field activities can vary widely. Entries in field logbooks will describe activities conducted and may include, but are not limited to, the following:

- Times of arrival and departure for ALL site personnel.
- Personnel on-site and affiliation (LTI and subcontractor, regulatory personnel, visitors/guests, and uninvited intruders).
- List of equipment used on-site (LTI and subcontractor).
- Detailed descriptions of daily activities.
- Locations of structures, features, utilities, etc.
- Conversations with client, contractor, regulatory agencies, office (changes to scope of work, health and safety

issues, and cost/payment issues are especially important).

- ♦ Weather conditions.
- ♦ Documentation of field instrument calibration.
- ♦ Documentation that photos were taken (include date/time of photo, photographer, site name/location, description of photo subject, compass direction taken, photo number).
- ♦ Sample collection and field measurement information including sample location, description, date/time, methodology, container types, preservatives, instrument type/serial number (reference applicable field form, if applicable).
- ♦ Wastes generated (containers, volumes, matrix, storage locations).
- ♦ Materials used (e.g., water sources, well materials, field reagents, construction materials).
- ♦ Deviations from intended scope of work.
- ♦ Deviations from SOPs if not already indicated in the work plan.
- ♦ Keep notes legible so others can read the logbook.

A bound logbook is the legal documentation of fieldwork performed at a site. Always remember that your notes may be used in litigation.

EXHIBIT 2

Initial Site Investigation Work Plan for BRRTS Activity # 02-13-584472

Plan prepared by

meadhunt.com

In collaboration with

limno.com

February 17, 2020 (revised)

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Tables

Figures

1.0 Introduction and Facility Information

Pursuant to the Wisconsin Department of Natural Resources (WDNR) October 11, 2019, letter regarding BRRTS Activity #02-13-584472 and a meeting on 21 January 2020, this document has been revised to provide a description of activities being initiated at the Dane County Regional Airport (Airport) to initiate the investigation of reported and suspected per- and polyfluorinated alkyl substances (PFAS). In the case of the storm water discharges, sampling data has established the presence of PFAS compounds in discharges from certain Airport storm water outfalls. Therefore, the need is to identify and isolate source(s) of illicit groundwater discharges containing PFAS into the storm sewer system so that interim corrective actions, such as lining, grouting, or other methods of removing infiltrating groundwater can be taken. The need to assess the likelihood of there being PFAS contamination will lead to soil and groundwater field investigations under a next phase if there is a risk of PFAS being present.

The purpose of this initial investigation is to evaluate the presence of PFAS in the Airport's storm water system and inform the next steps of investigation and interim remedial action planning. This work plan has been developed to address elements specified in Wisconsin Administrative Code NR 716.07 and 716.09. A description of the site and details of the proposed sampling and analysis strategy for this initial investigation are presented in this plan.

A work plan to address soil and groundwater field investigations of the burn pits in response to the October 7, 2019, letter (BRRTS #02-13-584369) is being prepared and will be submitted to WDNR separately.

The Airport is a joint use facility and a Part 139 certificated airport for which the FAA requires the use Aqueous Film Forming Foam (AFFF) for firefighting activities. The Wisconsin Air National Guard (Guard), a tenant at the Airport, provides firefighting services. As the military specification for AFFF currently requires PFAS, the Guard is participating in the cost sharing for the implementation of the investigation described in this Work Plan.

1.1. Site Name and Information

Site Name:	Dane County Regional Airport
Site Address:	4000 International Lane, Madison, WI 53704
Site Location:	All or parts of Sections 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, and 32 of Dane County Township 8N., Range 10E. See **Appendix A** for Airport Property Map.
Responsible Parties:	Wisconsin Air National Guard (WANG), 3110 Mitchell Street, Building 1210, Madison, WI 53704-2529 Dane County Regional Airport, 4000 International Lane, Madison, WI 53704 City of Madison, 210 Martin Luther King Blvd., #403, Madison, WI 53703
Consultants Involved:	Mead & Hunt, 2440 Deming Way, Middleton, WI 53562-1562 LimnoTech, 501 Avis Drive, Ann Arbor, MI 4108

A map showing the location and site layout of the Airport is shown in **Figure 1** and **Appendix A**.

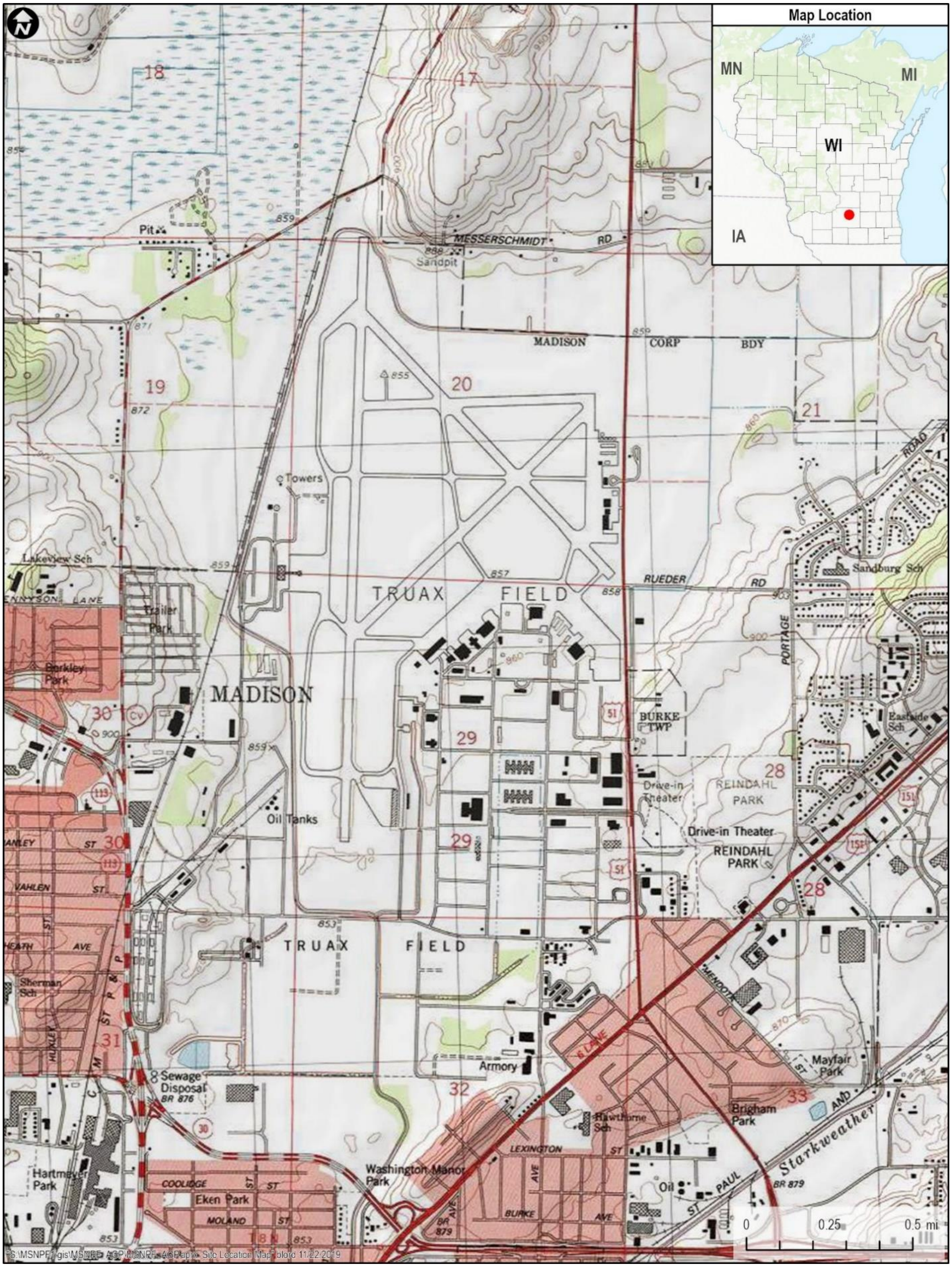

Figure 1. Topographic Quadrangle (DeForest Quad) Showing Location of the Airport.

1.2. Summary of Information Gathered During Scoping

Three sources of information were reviewed as part of the preparation of this work plan: the Phase 1 Regional Site Inspection of Truax Field conducted by Amec Foster Wheeler[1], surface water sampling in Starkweather Creek conducted in 2019 by WDNR[2], and storm water sampling conducted by Mead & Hunt at the Airport between April and June 2019[3].

A Phase 1 site inspection for perfluorinated compounds (PFCs, a.k.a. PFAS) was conducted for the National Guard Bureau at the Truax Field Air National Guard Base (Base) that is located on the southeast side of Airport property. Findings of the inspection were reported in March 2019[4]. The inspection included evaluation of nine (9) potential release areas characterized by sampling of soil and groundwater. Sampling indicated exceedance of the United States Environmental Protection Agency (USEPA) lifetime drinking water Health Advisory for PFOA and PFOS in drinking water in groundwater at nine (9) locations and exceedance of the calculated United States Air Force soil screening level[5] for PFOA and PFOS at two (2) locations. The report recommends further investigations to determine the nature and extent of PFC contamination at each of the nine (9) potential release areas.

In June 2019, WDNR collected surface water samples at four locations on Starkweather Creek, three (3) of which are downstream of the Airport. Varying numbers of PFAS compounds were detected in all samples at varying concentrations with a maximum result of 270 ng/L reported for PFOS at the Fair Oaks Avenue location on the West Branch. This location is approximately 1.5 miles downstream of the Airport, and the PFOS result was over three times higher than the result reported at the Anderson Street location, which is immediately downstream of the Airport.

In October 2019, WDNR collected surface water samples from an additional eleven (11) locations on Starkweather Creek, five (5) locations in Lake Monona, and fish samples from Starkweather Creek and Lake Monona. Varying PFAS compounds were detected in all samples at concentrations ranging from less than 5 ng/l to a maximum result of 3,700 ng/L reported for PFOS. The highest PFOS concentration was reported for a sample collected on an unnamed tributary to the West Branch of Starkweather Creek just east of where the West Branch of Starkweather Creek crosses Anderson Street. This location is south of the Airport and WANG property. The fish samples were collected from the lake, four (4) near the mouth of Starkweather Creek and one (1) further to the southwest away from any immediate effects of water from Starkweather entering the lake. The PFOS concentrations ranged 9.8-12 ppt and the PFOA concentrations ranged from 2.4-2.9 ppt.

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[1] Amec Foster Wheeler Environment & Infrastructure, Inc. 2019. *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.
[2] WDNR public notice.
[3] Dane County Regional Airport. October 7, 2019, letter to WDNR regarding supplemental PFAS sampling for WPDES Permit # WI 0048747-04-0 renewal application. October 2019.
[4] Amec Foster Wheeler Environment & Infrastructure, Inc. 2019. *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.
[5] U.S. Air Force screening level (1,260 ug/kg) calculated using the USEPA Regional Screening Level calculator.

In April, May, and June 2019, Mead & Hunt collected samples at the request of WDNR at outfalls that are sampled as part of the Airport's Wisconsin Pollutant Discharge Elimination System (WPDES) permit. Monitoring was conducted during wet and dry weather conditions, and the results were reported to WDNR on October 7, 2019. Sample results indicated the presence of several PFAS compounds at outfalls 003, 032, 001, 034, and 102. Concentrations were generally similar during wet and dry conditions and overall average highest concentrations were observed at outfall 032. Only one compound (PFBA) was detected in one of the two samples collected at outfall 101.

Information from these sources has been used to prepare this work plan and will continue to be reviewed, along with the findings of the efforts described in this work plan, to inform appropriate future investigation activities.

1.3. Physiographic and Geological Setting Information

This section provides general physiographic and geological setting information as summarized in the Phase 1 Regional Site Inspection of Truax Field and other sources.

1.3.1. Topography

The Airport is in south central Wisconsin, northeast of the city of Madison. The Airport is located at an elevation of approximately 890 feet above mean sea level (MSL), and topography at the Airport is generally level. The Airport is within the Great Lakes Section of the Central Lowlands Physiographic Province, which is characterized by numerous lakes with associated lacustrine plains, prominent end moraines, and a still partially exposed cuestaform topography[6]. Lakes Mendota, Monona, and Waubesa are located to the southwest and south of the Airport.

1.3.2. Surface water drainage

Surface water drainage at the Airport is to Starkweather Creek, which flows around the Airport on the north, west, and south sides. Surface water flow at the Airport is conveyed by ditches, culverts, and storm sewers that outfall to Starkweather Creek. Starkweather Creek empties into Lake Monona approximately 2 miles to the south.

1.3.3. Geology

Information provided in the Phase 1 Regional Site Inspection of Truax Field include the following summary observations that we believe to be representative of the Airport. The geology and hydrogeology information will be field verified during the next steps investigation:

- Bedrock in the Central Lowlands Physiographic Province is primarily of Paleozoic age. There is also some bedrock of Cretaceous age underlying the western boundary of the province.
- Rock strata are generally flat to gently inclined, and the topographic effects of glaciation are common throughout the province.

[6] PEER Consultants, P.C. 1988. Final Preliminary Assessment, 128th Tactical Fighter Wing, Wisconsin Air National Guard, Truax Field, Madison, Wisconsin in *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.

- Structurally, regional dips are controlled by numerous domes and uplifts. Except the southern border, the entire province is bordered by topography that is higher in elevation[7].
- Glacial deposits in southern Wisconsin range in thickness from a few feet to several hundred feet. Because the Airport is situated on a locally thick (approximately 300 feet) section of glacial drift, several geologic layers encountered elsewhere in the region do not occur beneath the Airport. There is an approximately 350-foot layer of Mt. Simon Sandstone bedrock beneath the glacial till underneath the Airport[8].

1.4. General hydrogeologic information

Information provided in the Phase 1 Regional Site Inspection of Truax Field includes the following summary observations that we believe to be representative of the Airport:

- Regionally, groundwater is found in the unconsolidated glacial deposits and underlying bedrock formations including sandstone of the Trempealeau Group, the deeper Tunnel City Group, and the underlying Elk Mound Group. These bedrock aquifers comprise the principal water supply aquifers in Dane County. The Mt. Simon Sandstone underlying the glacial deposits in the vicinity of the Airport is the lowermost formation of the Elk Mound Group.

  Based on information collected during 2017 investigation activities, monitoring wells within the water table zone indicate shallow groundwater flow is generally toward the south and southeast. The water table at the Airport is generally encountered at depths of 5 to 10 feet below ground surface, and groundwater flow gradients calculated from the investigations indicate groundwater flow velocities of 0.5 to 0.9 feet per day.

- There are currently no known drinking water supply wells at the Airport, and the shallow groundwater system in the vicinity of the Airport is not used as a source of drinking water. Based on information obtain during the investigations, four (4) private wells may have been located in the immediate vicinity of the Airport prior to initial construction activities in 1942; however, in light of the extensive development in the area, the four (4) private wells are believed to be abandoned or not in use[9.] As part of the proposed investigation, additional records search will be conducted to verify this, if possible.

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[7] PEER Consultants, P.C., 1988. Final Preliminary Assessment, 128th Tactical Fighter Wing, Wisconsin Air National Guard, Truax Field, Madison, Wisconsin in *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.
[8] Amec Foster Wheeler Environment & Infrastructure, Inc. 2019. *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.
[9] Amec Foster Wheeler Environment & Infrastructure, Inc. 2019. *FY 16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Wisconsin Air National Guard Truax Air National Guard Base Madison, WI*. Amec Foster Wheeler Environment & Infrastructure, Inc. March 2019.

1.5. Potential migration pathways

Based on the initial review of information identified to date, potential migration pathways from the Airport may include storm water discharge and groundwater flow. These potential migration pathways will be evaluated as part of this work plan.

Elements of this work plan include the following tasks:

- Task 1 – Information Collection and Data Validation;
- Task 2 – Storm Water Discharge Monitoring; and;
- Task 3 – Identification of Next Steps.

Each task is described in the following sections.

2.0 Task 1 – Information Collection and Data Validation

Mead & Hunt will work closely with the Airport in the collection of the following reports/information that will support the storm water investigations:

- Historical use of and locations for PFAS compounds at the Airport
- Geotechnical reports for historical and current Airport projects
- Potential areas where PFAS compounds were used and/or stored at the Airport
- WANG reports under BRRTS 02-13-581254
- Stream and storm water sampling data from the WDNR and Airport, respectively
- Obtaining analytical results and data packages from the Airport, ANG, and WDNR

A Quality Assurance/Quality Control (QA/QC) review of the compiled analytical data will be conducted to evaluate its utility and validity in supplementing the current and future investigations.

3.0 Task 2 - Storm water Discharge Monitoring

The Monitoring Program discussed in this section describes the strategy, locations, methods, and frequencies for monitoring activities under this study. This section also includes a description of QA/QC measures that will be employed and the estimated schedule of activities.

3.1 Sampling Strategy

The strategy for storm water discharge sampling is to identify sources of PFAS entering the storm sewer system for two purposes: (1) To plan interim remedial actions such as lining, grouting, or other isolation methods to reduce the PFAS discharge from the storm sewer system; and (2) as a step to locate the origins of PFAS discharges.. Per the meeting on January 21, 2020, WNDR has requested implementing the draft work plan submitted on December 6, 2019 while the revisions are being prepared and submitted to them for approval. LimnoTech is scheduling this initial storm water system sampling as soon as possible. This sampling will be considered a "dry" conditions event which will allow observations of infiltrating groundwater locations into the storm water systems. A subsequent "wet" weather sampling event will be planned following evaluation of data collected from the proposed sampling event as weather permits.

The initial sampling event will focus on Outfalls 001, 032, and 021 storm water drainage areas. These areas were selected based upon a review of previous Mead & Hunt and WDNR sample data and locations. The sampling teams will collect water samples starting at the lower ends of each sub basin and subsequently work their way upstream through the collection of samples from where pipes entering a junction. Initial samples will be collected from major storm sewer junctions to further aid in identifying specific groundwater infiltration locations with elevated PFAS concentrations. GPS coordinates and flow data will also be collected at each junction sampled to support mass balance estimates. Additional samples may be collected as necessary in sub basins where elevated PFAS concentrations are detected to further define the source of PFAS.

Sections of the storm sewer system that are identified as being a source of elevated PFAS concentrations will be televised to identify areas with excessive infiltration of high PFAS groundwater to identify pipe defects and appropriateness of lining, grouting, or replacing. The proposed televised results will be compared to the previous effort to evaluate pipe integrity. The results of the televising effort and storm water data will be used to assess where the pipes are compromised and inform strategies for interim measures, such as slip lining or grouting to reduce infiltration of groundwater with elevated PFAS concentrations.

Samples for PFAS compounds at the Airport's existing storm water outfalls (003 to 020, 022, A, 024 to 030, 033 to038) will also be collected during dry weather conditions to characterize storm water runoff from the other drainage areas at the Airport during different runoff conditions. If these additional outfall samples do not indicate PFAS levels, then the outfall drainage basin will be assumed to be unaffected by PFAS source areas and further analysis will not be conducted. However, if an outfall has PFAS levels that warrant further investigation upstream in the basin, then the detailed sampling methodology utilized at Outfalls 001, 021, and 032 will be completed as soon as possible. Sampling data will be used along with data previously generated to systematically extend subsequent monitoring, as necessary, into other branches of the storm drainage network where impacted groundwater might be infiltrating the system.

Sampling locations, frequency, and analyses are described on the next page.

3.2 Monitoring Locations

Storm water runoff will be sampled at the outfall locations shown in **Figure 2**. Samples will be collected as grab samples (see Section 3.2.2). Additional samples will be collected upstream of outfalls within the existing storm water conveyance system based on engineering professional judgement. Earlier sampling of outfalls 001 and 032 had elevated PFAS concentrations so additional samples will be collected within those drainage areas during the dry weather sampling. The elevated PFAS concentration measured downstream of outfall 021 indicates discharges from outfall 021 are a possible source of PFAS so additional sampling is proposed in the outfall 021 collection system. The proposed locations of the sampling points in outfalls 001, 032, and 021 sub basins are shown in **Figure 3, Figure 4,** and **Figure 5**, respectively.

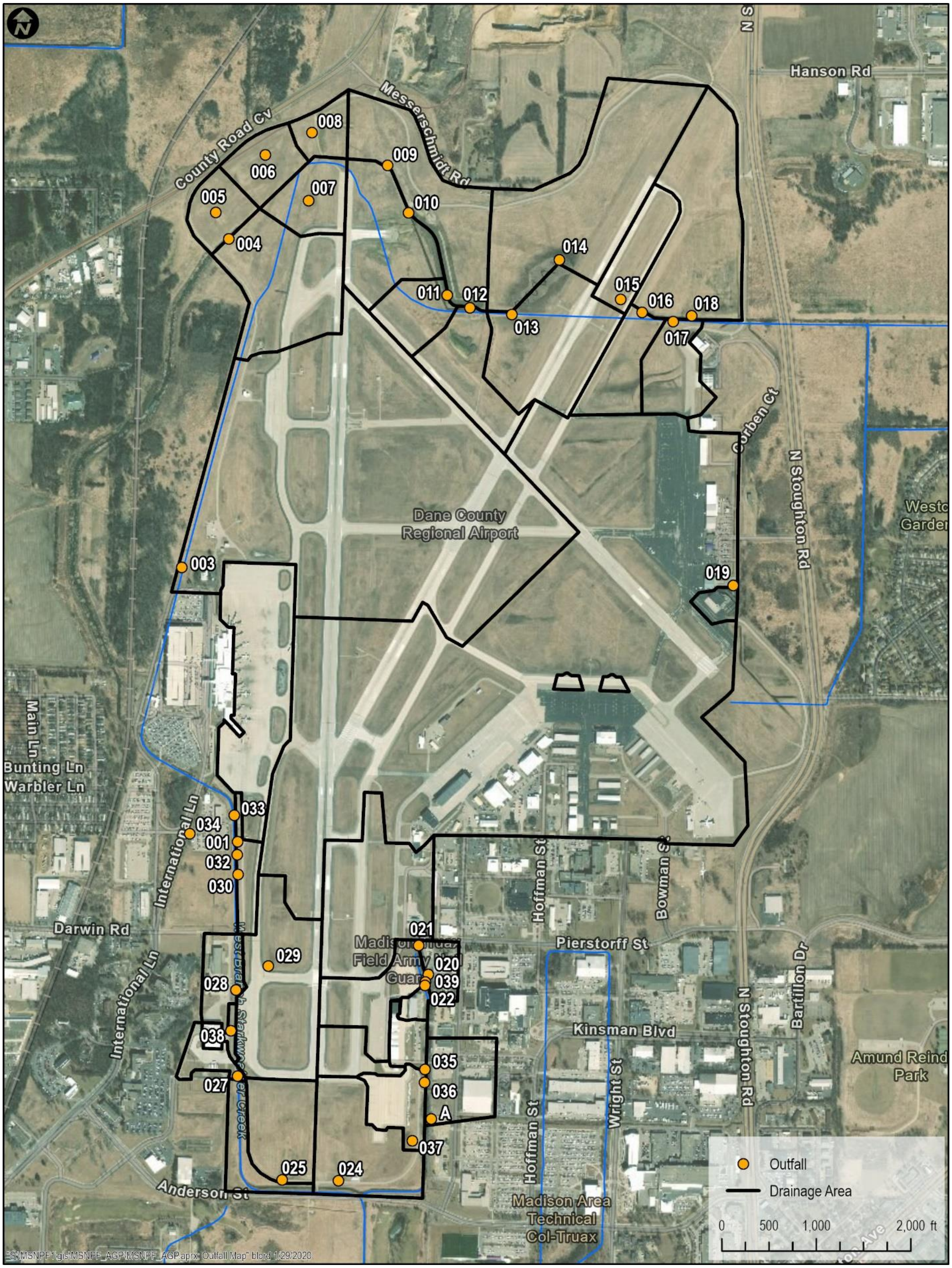


Figure 2. Storm water Outfalls.

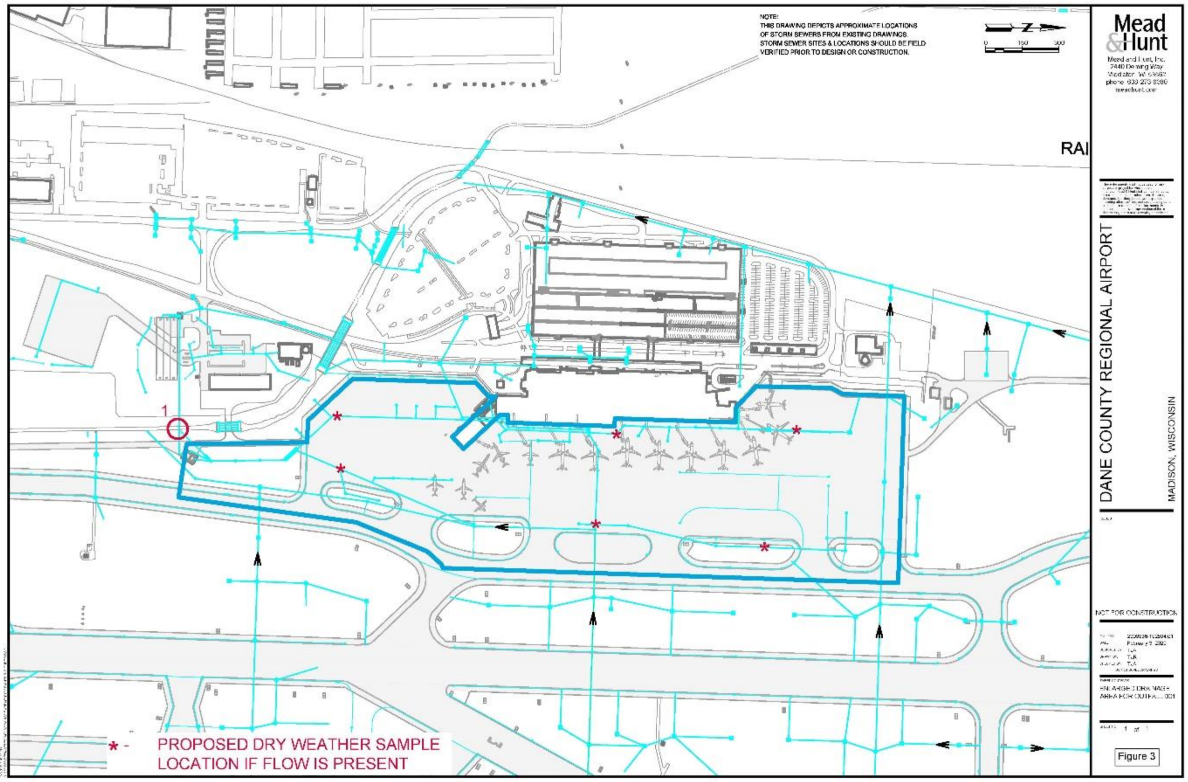


Figure 3. Additional Sampling Locations in the Outfalls 001 Drainage Networks

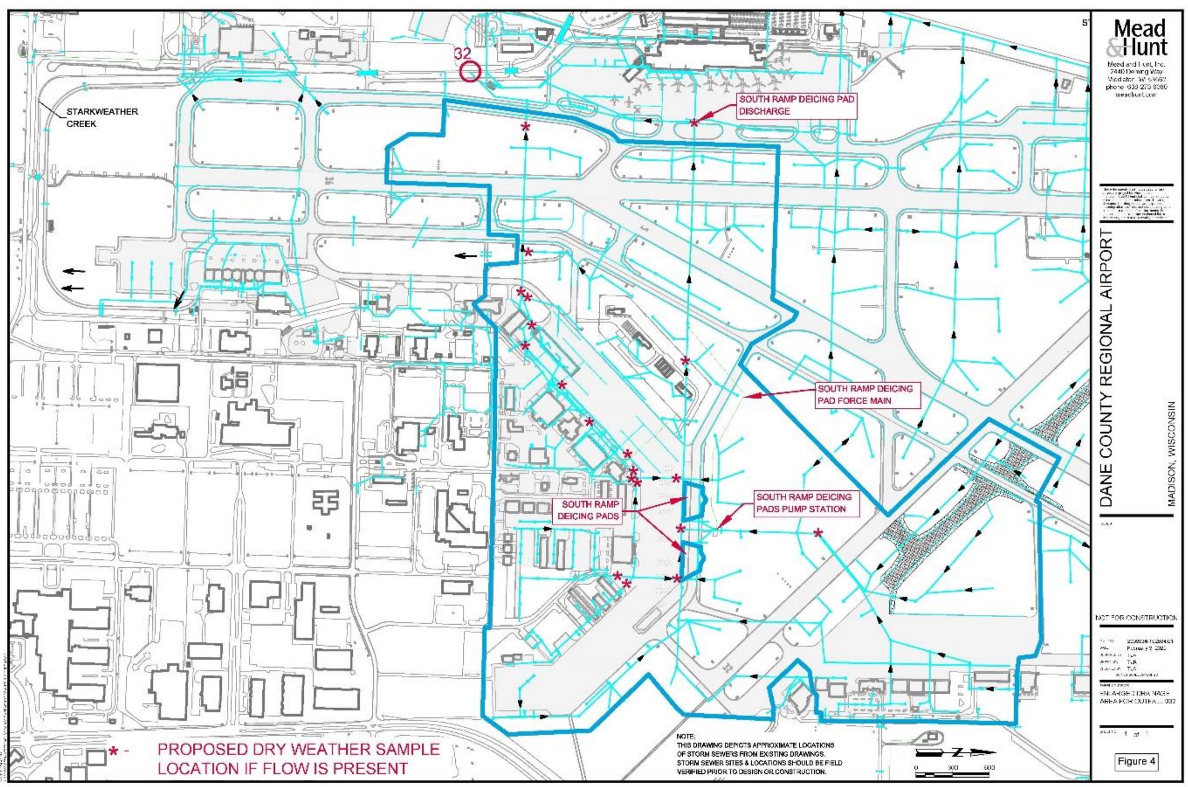


Figure 4. Additional Sampling Locations in the Outfalls 032 Drainage Networks

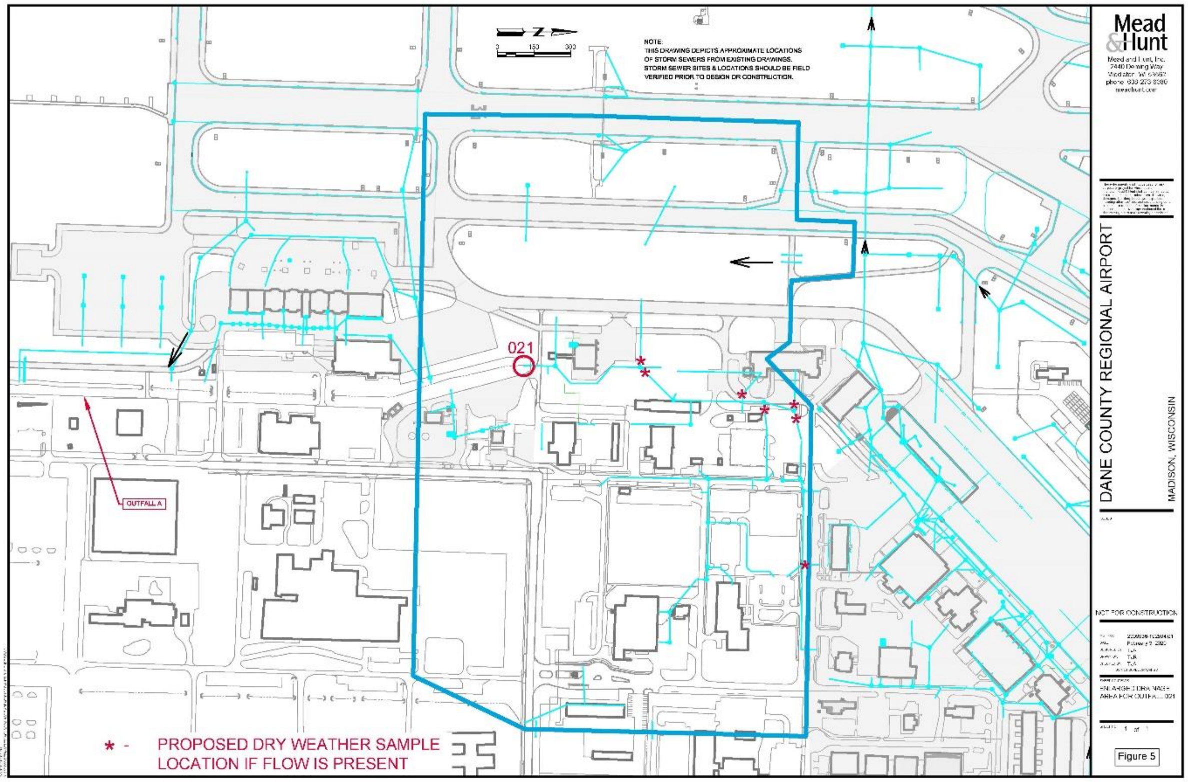


Figure 5. Additional Sampling Locations in the Outfalls 021 Drainage Networks

Table 1 contains a summary listing of the outfalls to be sampled as part of this effort.

Table 1. Outfall Summary.

Outfall	Description
1[1,2]	30" RCCP
3[1,2]	66" RCCP
4	36" RCCP
5	Inlet (21" RCCP)
6	Inlet (27" RCCP)
7	Inlet (30" RCCP)
8	Inlet (15" RCCP)
9	18" RCCP
10	12" RCCP
11	21" RCCP
12	29" x 45" HECP
13	Grass Swale
14	Grass Swale
15	Inlet
16	30" RCCP
17	48" RCCP
18	Grass Swale
19	12" DI
20	18" RCCP

Outfall	Description
21	Grass Swale
22	21" RCCP
24	Grass Swale
25	18" RCCP
26	Grass Swale
27	18" RCCP
28	18" RCCP
29	18" RCCP
30	18" RCCP
32[1,2]	60" RCCP
33	Grass Swale
34[1,2,3]	4" HDPE
35	24" RCCP
36	42" RCCP
37	2-12"" RCCP and 4" HDPE
38	18" RCCP
39	12" RCCP
A	18" RCCP

[1] **NPDES sampling outfall.**
[2] **Sampled earlier in 2019 for PFAS.**
[3] **Same drainage area of 001. Will not be sampled.**

During each sampling event, samples will be collected if flow is present. If no flow is present, the condition will be noted as part of the documentation of field activities. If the outfall cannot be safely accessed, a sample will be collected at the closest available upstream location within the storm water system. This condition will also be noted as part of the documentation of field activities.

3.2.1 Monitoring Events and Sampling Frequency

One wet and one dry weather event will be monitored at selected outfalls based upon the results of the dry weather samples to characterize storm water quality. A qualifying rainfall event will be defined as a storm event causing greater than 0.1 inch of rainfall and occurring at least 72 hours after the previous measurable storm event that created 0.1 inch of rainfall. The dry weather event will be conducted following a period of at least 72 hours after the previous measurable storm event that created 0.1 inch of rainfall.

Meteorological data will be monitored and obtained from the National Weather Service (NWS) monitoring station at the Airport. Meteorological data recorded during qualifying rainfall events will include the following parameters:

- Minimum, maximum, and average temperature
- Total precipitation
- Duration of precipitation

Forecasted rainfall from this station will be used to identify qualifying rainfall events based on forecasted rainfall depth and time since the last event.

3.2.2 Analytical Parameters and Methods

Storm water samples will be collected manually, as grab samples and flow rates will be measured at each location. Each sample will be analyzed for appropriate PFAS compounds using Method 537 (Modified). Samples collected will be submitted to a certified, qualified Laboratory for analysis. **Table 2** provides a summary of PFAS compounds to be analyzed and expected quantitation limits as provided by the laboratory. Flow measurements will be used to estimate PFAS mass balances.

We are recommending reducing the number of PFAS compounds for this analytical sampling. Our justification is that several of the WDNR proposed compounds have not been detected in any of the samples collected to date (either WDNR or M&H events) and the same Method 537 analysis for the standard 24 compounds can be performed by a certified laboratory.

All laboratory reports will be submitted electronically following analysis of each sample batch.

Table 2. Summary of Storm water Sampling PFAS Analytical Parameters.

Analyte Name	CAS#	Analyte	RL (ng/l)
Perfluorobutanoic acid	375-22-4	PFBA	6.9
Perfluoropentanoic acid	2706-90-3	PFPeA	3.4
Perfluorobutanesulfonic acid	375-73-5	PFBS	3.4
Perfluorohexanoic acid	307-24-4	PFHxA	3.4
Perfluoroheptanoic acid	375-85-9	PFHpA	3.4
Perfluorohexanesulfonoic acid	355-46-4	PFHxS	3.4
6:2 Fluorotelomer sulfonic acid	27619-97-2	6:2-FTS	6.9
Perfluorooctanoic acid	335-67-1	PFOA	3.4
Perfluoroheptanesulfonoic acid	375-92-8	PFHpS	3.4
Perfluorooctanesulfonic acid	1763-23-1	PFOS	3.4
Perfluorononanoic acid	375-95-1	PFNA	3.4
Perfluorodecanoic acid	335-76-2	PFDA	3.4
8:2 Fluorotelomer sulfonic acid	39108-34-4	8:2-FTS	6.9
Perfluorooctane sulfonamide	754-91-6	PFOSA	3.4
Perfluorodecanesulfonic acid	335-77-3	PFDS	3.4
Perfluoroundecanoic acid	2058-94-8	PFUnA/PFUdA	3.4
Perfluorododecanoic acid	307-55-1	PFDoA	3.4
Perfluorotridecanoic acid	72629-94-8	PFTrDA	3.4
Perfluorotetradecanoic acid	376-06-7	PFTeDA	3.4
N-ethyl perfluorooctanesulfonamidoacetic acid	2991-50-6	EtFOSAA	17.0
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	MeFOSAA	17.0
4:2 Fluorotelomer sulfonic acid	757124-72-4	4:2-FTS	6.9
Perfluoropentane sulfonic acid	2706-91-4	PFPeS	3.4
Perfluorononane sulfonic acid	68259-12-1	PFNS	3.4

3.2.3 Quality Assurance / Quality Control

This section outlines the QA/QC measures that will be used during field monitoring activities.

3.2.4 Sample Handling and Custody

Field Sampling Custody

The objective of field sample custody is to assure that samples are traceable and are not tampered with between sample collection and receipt by the analytical laboratory. A person will have custody of a sample when the samples are:

- In their physical possession;
- In their view after being in their possession;

- In their personal possession and secured to prevent tampering; and
- In a restricted area accessible only to authorized personnel, and the person is one of the authorized personnel.

Field custody documentation will consist of both field log books and chain of custody forms.

Field Logbooks

Field logbooks serve as a daily record of events, observations, and measurements during field activities. All information pertinent to monitoring activities is recorded in the logbooks, and will include:

- Name and title of author
- Name(s) of field crew personnel
- Name of site and project code
- Description of sample location
- Number and volume of samples taken
- Date and time of collection
- Sample identification numbers
- Sampling method
- Preservatives used
- Field measurements (flow rates, temperature, pH, etc.)
- Field observations (weather conditions, flow appearance, etc.)
- GPS coordinates for each junction.

Chain-of-Custody Forms

Completed chain-of-custody forms will be required for all samples to be analyzed. Chain-of-custody forms will be prepared by the field sampling crew during the daily sample collection events. The chain-of-custody form will contain the following information:

- Unique sample identification number
- Sample location
- Sample date and time
- Sample description
- Sample type
- Sample preservation
- Analyses required
- Sampling staff

The original chain-of-custody form will accompany the samples to the laboratory. The chain-of-custody forms will remain with the samples and will be signed by a representative of the laboratory upon receipt of the samples.

Quality Control Requirements

Field Measurements

The accuracy of field measurements will be maintained through calibration of the field instruments according to manufacturer's specifications. Accuracy will be checked prior to the sampling event and following the sampling event and recorded in the field logbook.

Field Duplicates

Field duplicates (splits) will be collected and analyzed to check the precision or reproducibility of sampling and analytical procedures. Field duplicates are defined as two separate samples collected at a single location and time, labeled with separate identification codes so the laboratory cannot identify the samples as duplicates. Duplicate samples will be collected at the rate of approximately 10 percent. The duplicate samples will be handled and analyzed by the laboratory as with all other samples.

Field Blanks

Field blanks will be analyzed to check for chemical constituent infiltration and sample bottle contamination originating from sample transport and storage. A field blank will consist of analyte-free water poured into a sample bottle at the sample site and preserved according to the parameters to be analyzed. Field blanks will be collected at the rate of one per event.

3.3 Special Precautions: PFC-Free Equipment, Supplies, Materials and Clothing

Special precautions shall be employed to minimize the possibility of sample cross-contamination related to the low PFAS detection limits and the widespread use of PFAS in consumer products and industrial processes, including:

- Conduct sampling beginning in areas of known or suspected lowest concentrations and progressing to areas of highest concentrations;
- Water used for equipment cleaning/rinsing will be sampled periodically to evaluate potential PFAS content;
- Sampling equipment and materials should be free of polytetrafluorethylene (PTFE), ethylene tetrafluoroethylene (ETFE), and fluorocarbon-based products (e.g., field filters, sample tubing, etc.); and
- Personal protective equipment, clothing, and hygiene products should be free of PFAS (e.g., fluoropolymer linings used on Tyvek, Nomex, and Viton materials, GoreTex linings, water resistant/waterproof/stain resistant treatments, sunblock, insect repellents, cosmetics/hand creams, food packaging protective of water and grease). All equipment, materials, supplies and clothing used during field activities must be PFC-free in accordance with the guidelines presented below.

LimnoTech's standard operating procedure for PFAS sampling is contained in **Appendix B**.

3.4 Data Assessment

QA review of all data will be conducted and documented before the data are reported in any way other than the original laboratory reports.

3.4.1 Laboratory Data Review and Validation

Laboratory QA review will be conducted in accordance with the laboratory Quality Assurance Plan (QAP). Upon receipt of the laboratory report for each sample batch, the project QA reviewer will verify that internal laboratory QA was conducted.

3.4.2 LimnoTech Data Review and Validation

When data are received from the analytical laboratory, they will be evaluated by the project QA reviewer to determine if they meet project requirements. Specific items to be reviewed during data validation are:

- Chain of custody completeness
- Holding times
- Duplicate analyses data
- Field and equipment blank data
- Precision and accuracy data
- Matrix spike and matrix spike duplicate data
- Surrogate standards (where applicable)
- Overall data assessment

The project QA reviewer will document the QA review of each data set in writing.

3.5 Anticipated Schedule and Reporting

It is expected that sampling of the two events will be completed within three months of plan approval, subject to the occurrence of qualifying rainfall events as described above.

After the initial dry weather sampling of the outfalls and detailed Outfalls 001, 021, and 032 sub-basin sampling has been completed, the Mead team will prepare a report summarizing the sample results for submittal to WDNR two to three weeks following data arrival. The report will contain the following information:

- Dates and duration of storm events;

- Meteorological conditions (rainfall, air temperature, etc. as reported by the National Weather Service, Madison station);
- Field measurements;
- Description of any deviation(s) from standard operating procedures;
- Laboratory reports and notations for the parameters to be reported;
- Duration between sampled event and end of previous storm event; and
- Parameter concentrations.

Additional reporting for wet condition events sampling is dependent on weather conditions and evaluation of initial "dry" weather sampling.

4.0 Task 3 – Next Steps

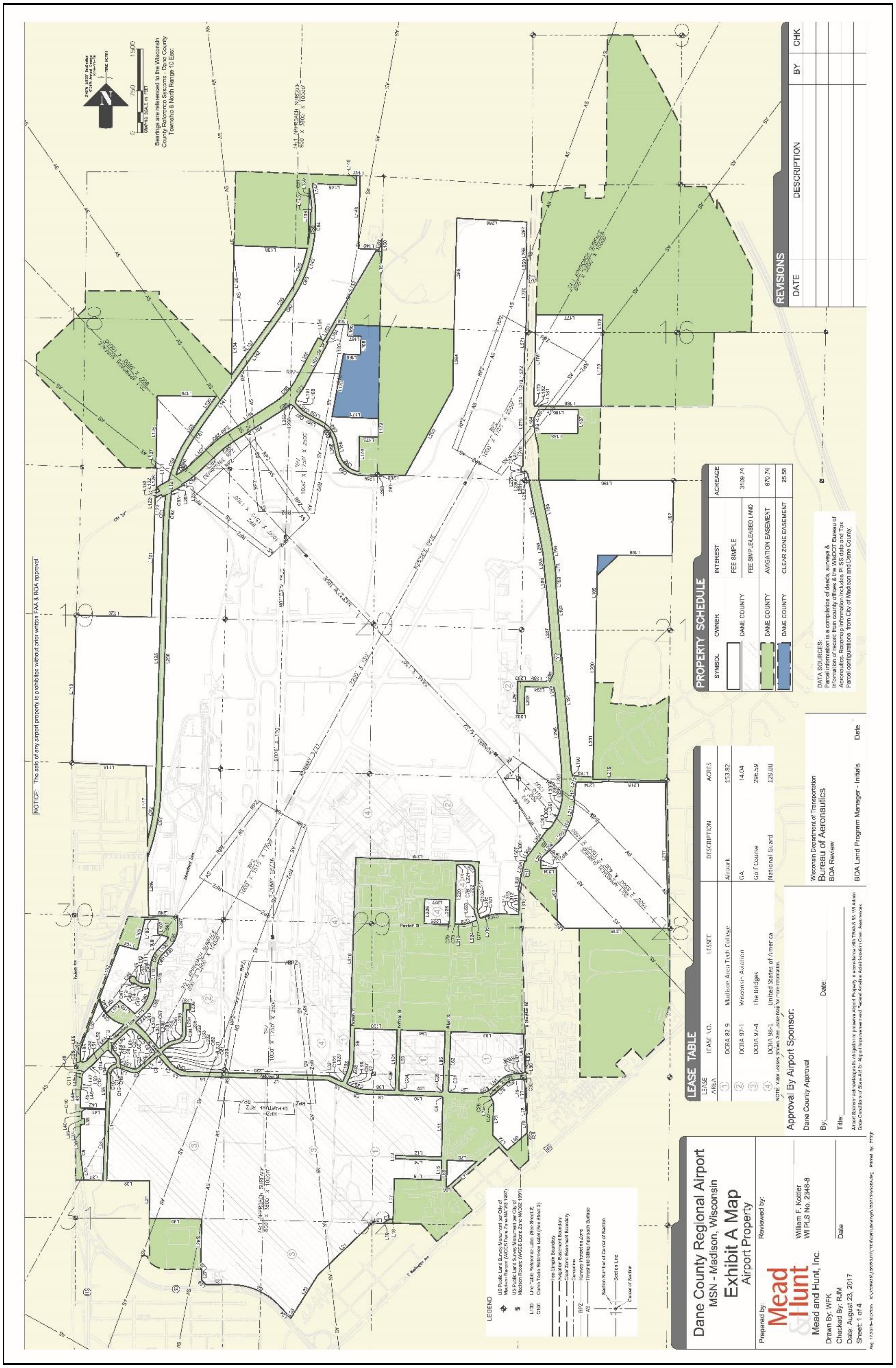
The next steps will be determined by the results of Tasks 1 and 2. The storm water sampling effort will identify specific locations and mechanisms by which PFAS is entering the storm sewer network and provide the basis for interim remedial actions to stop illicit discharges to the network. Such actions will be designed and implemented to minimize PFAS in the water discharged at the storm water outfalls. Follow-up sampling at the outfalls would evaluate the effectiveness of the actions taken to reduce or remove the source(s) of PFAS to the storm sewer network.

Video surveillance of the storm water conveyance system will be utilized to identify compromised pipe sections. The Airport team will review the results of the sampling and pipe surveillance efforts to identify portions of the storm sewer that should be repaired to reduce groundwater infiltration. The Airport will seek the appropriate funding sources to implement recommended interim remedial actions and may need to get FAA approval depending upon work area locations. A schedule for implementing recommended actions is dependent upon approvals by FAA, County, and Airport agencies.

Concurrent with data analysis and report writing of the dry weather event, provisions will begin for the televising of pipes. The extent of pipe televising will be decided with Airport, WDNR and Mead & Hunt team representatives following submittal of the Dry Weather Report to the WDNR. The team will evaluate the pipe lining and grouting methods to reduce PFAS discharges. Selected methods will then be used for interim remediation actions. Other potential interim mitigation may also be investigated during completion of the work plan. The general proposed timeline is as follows:

1. Dry Weather Sampling report submitted to WDNR – two to three weeks after data received from laboratory
2. Begin arrangements for televising of lines – concurrent with dry weather sampling report preparation
3. Develop interim action plan based on sampling and videotaping results – anticipated to be a combination of pipe lining and grouting – initiate with submittal of sampling report
4. Procurement of contractor for interim remediation actions – The Airport is committed to proceeding with prudent interim actions. The timing is dependent on scope of repairs, regulatory agency approval, and funding sources and the Airport will work to minimize delays within its control.

APPENDIX A Airport Property Map


Dane County Regional Airport
MSN - Madison, Wisconsin
Exhibit A Map
Airport Property
PROPERTY SCHEDULE
LEASE TABLE
REVISIONS

APPENDIX B Standard Operating Procedures

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I. INTRODUCTION

This standard operating procedure (SOP) is applicable to the collection of representative samples for analysis of per- and polyfluoroalkyl substances (PFAS; also referred to as and subsets of perfluorinated chemicals (PFCs)). The procedures described are intended to be applicable to most environmental media and sampling methods, although they were developed with an emphasis on water samples (e.g., drinking water, ground water, surface water). These typically applicable procedures have been adapted from a number of sources and may be varied or changed as required, dependent upon site conditions or equipment and procedural limitations, as long as the goal of collecting representative samples is maintained. The actual procedures used should be documented in the field notes, especially if changes are made. This SOP is designed to be used in conjunction with another SOP that describes the specific sampling methods for a specific environmental medium.

PFAS are a large group of chemicals used in many consumer, commercial, and industrial products and processes, and include water-, stain-, and oil-repelling coatings and fire-fighting foams. Some chemicals in this group (e.g., perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)) have been identified as persistent, bioaccumulative, and toxic chemicals. PFOS, PFOA, and their known precursors were largely phased out in the United States in the mid-2000s and early 2010s. Sample analytical reporting for PFAS analytes is usually at very low concentrations (parts per trillion, ppt), which can exacerbate problems with cross-contamination of samples.

There are two primary interferences or potential problems with representative sampling. These include cross contamination of samples and improper sample collection. Following proper decontamination procedures and minimizing disturbance of the sample site will minimize these problems as follows:

- Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment for each location. If this is not possible or practical, then decontamination of sampling equipment is necessary. Refer to the Equipment Cleaning SOP.
- Conduct sampling beginning in areas of known or suspected lowest concentrations and progressing to areas of highest concentrations.
- Improper sample collection can involve using contaminated equipment, disturbance of stream or impoundment substrate, and sampling in an obviously disturbed area.

To collect a representative sample, the hydrology and morphometrics of a stream or impoundment should be determined prior to sampling. This will aid in determining the presence of phases or layers in lagoons or impoundments, flow patterns in streams, and appropriate sampling locations and depths. In addition, water quality indicator data may be collected, if necessary, in water bodies to determine if stratification is present. Measurements such as dissolved oxygen, pH, temperature, and redox potential can indicate if strata exist which would affect analytical results.

II. MATERIALS

A wide range of products commonly used in site investigations are known or suspected to contain PFAS. It is critical that the sampling program design consider as many sources of PFAS contamination as practicable to minimize cross contamination during a sampling event. All field equipment, supplies, materials and personnel clothing used during sampling operations shall be PFAS free as noted below and in Tables 1 and 2.

- All sampling, monitoring and drilling equipment (e.g., field filters, tubing, pumps, lubricants, packers, transducers, liners, O-rings, pipe-thread pastes, tapes, sealants, valves, and wiring) must be constructed of materials that are free from the following:
  a) Polytetrafluorethylene (PTFE), trademark Teflon®;
  b) Ethylene tetrafluoroethylene (ETFE), trademark Tefzel®;
  c) Polyvinylidene fluoride (PVDF), trademark Kynar®;
  d) Fluorinated ethylene propylene (FEP), trademark Neoflon®.
- Personal protective equipment, clothing, and hygiene products should be free of PFAS (e.g., fluoropolymer linings used on Tyvek, Nomex, and Viton materials, GoreTex linings, water resistant/waterproof/stain resistant treatments, sunblock, insect repellants, cosmetics/hand creams, food packaging protective of water and grease).
- Sample containers should be polypropylene or HDPE and/or as specified/provided by the laboratory; do not use glass to avoid analyte adsorption.
- Sample transfer to the laboratory should be conducted at 4°C ± 2°C or as specified by the laboratory using ice in double-bagged polyethylene plastic; do not use chemical- or gel-based cooling products.
- Use only laboratory-supplied PFAS-free water for preparation of field reagent blanks and equipment blanks.
- Water from any other sources, including public water supplies, used for any other purposes must be pre-determined to be PFAS-free.
- Deionized (DI) water will not be used to clean equipment due to the possible contamination from polytetrafluoroethylene material used in the DI water purification system.

III. PREPARATIONS

- Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
- Obtain the necessary sampling and monitoring equipment to suit the task. Consider sample volume, depth, deployment circumstances (shore, wading, boat, currents), type of sample, sampler composition materials, and analyses to be conducted.
- Decontaminate or pre-clean equipment and ensure that it is in working order.
- Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate.
- Perform a general site survey prior to site entry, in accordance with the site-specific Health and Safety Plan.
- Use stakes, flagging, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.
- If collecting sediment or near-shore soil samples, develop procedures that will eliminate interferences with collection of representative water samples.
- The field team leader will work with field personnel to assure compliance with PFAS-free guidelines (see Table 1)

prior to commencement of field activities. Table 2 provides a list of prohibited and acceptable items for a PFAS field investigation. Daily compliance inspections will be conducted prior to beginning field activities. Corrective action will include removal of noncompliance items or workers from the site until in compliance.

IV. GENERAL SAMPLE COLLECTION PROCEDURES

1. Record pertinent data on the field log (see attached Surface Water Sampling Field Log, or equivalent).
2. Label all sample containers with the date, time, well number, site location, sampling personnel, and other requested information.
3. Don appropriate personal protective equipment (as required by the Health and Safety Plan).
    - ♦ Do not sample without powderless nitrile gloves.
4. Clean all sampling equipment prior to sample collection according to the procedures described in Section V.
5. Sample collection (see Tables 1 and 2 for complete lists of acceptable and unacceptable attire, materials, etc.):
    - ♦ The sample cap should never be placed directly on the ground during sampling.
    - ♦ Markers (Sharpie® or otherwise) are to be avoided.
    - ♦ Bottles should only be opened immediately prior to sampling.
    - ♦ Dust and fibers must be kept out of sample bottles.
    - ♦ Ballpoint pens may be used to label sample containers.
    - ♦ Samples should be double bagged using resealable low-density polyethylene (LDPE) bags (e.g. Ziploc®.
    - ♦ If possible, collect PFAS samples prior to collecting samples for other, non-PFAS analytes (e.g., VOCs) or field parameters (temperature, pH, etc.).
6. For samples requiring field filtering, use the appropriate PFAS-free equipment and, if possible, collect the sample directly into the sample container.
7. If field preservation is required (see SAP and/or QAPP), place appropriate preservative into the sample container prior to sample collection. Note the preservative used on the sample container and sampling log.
8. Quality control samples are normally specified and described (i.e., collection procedures, frequencies) in the work plans (SAP and/or QAPP), and for PFAS sampling they may include trip blanks, field reagent blanks, field equipment blanks, field duplicate samples, and matrix spike/matrix spike duplicate samples. These samples should be collected in the following manner:
    - ♦ Trip blanks should be prepared by the laboratory using PFAS-free water at the time sample bottle ware is prepared for delivery to the field. Trip blank containers shall be of the same type of sample container as those used for investigative samples collected for PFAS analysis. A

laboratory-supplied trip blank (comprised of the same sample containers, containing the same reagents, preservatives and other consumables used for investigative PFAS analysis) shall be placed in the environmental sample cooler immediately after the first sample collected for PFAS analysis is placed in the cooler. Trip blank samples shall be given a sample date and time of when the trip blank is placed in the environmental sample cooler. Trip blank samples shall accompany investigatory sample containers collected for PFAS analysis from collection, during the duration of the sample event, and during shipment to the laboratory. At no time after preparation and prior to arriving at the laboratory shall trip blanks be opened.

- ♦ Field reagent blanks should be collected using two appropriate laboratory-supplied containers (one containing PFAS-free water and the other empty). During the sampling event, field personnel transfer the preserved PFAS-free water from one container into the other container, screw on the laboratory-supplied caps, and place the sample containers into the cooler for submittal with the samples collected that day.
- ♦ Field equipment or rinse blanks should be collected by pouring PFAS-free water through/over the decontaminated sampling device into the sample container in the field, preserved and shipped to the laboratory with the field samples. Generally, equipment blanks are only collected if reusable sampling equipment is employed.
- ♦ Field duplicate samples should be collected into two distinct sample containers at the same time or immediately following one another in accordance with procedures described in the SAP or QAPP. Each sample of a field duplicate pair employs the same type of sample container, preservatives and other additives used. If blind duplicate samples are specified, one of the duplicate samples should be labelled so that it does not identify the other sample of the duplicate pair to the laboratory. For example, one sample of the duplicate pair would be labelled following the normal protocol, while the second would be labelled with a sample ID of “DUPLICATE” and a blank line placed in the location, date and time boxes of the sample label. It is important that the duplicate pair samples are identified separately in the field notes with information including location, sample ID (as entered on the sample container label and COC), sample date and time so that analytical results can be paired after received from the laboratory.
- ♦ Matrix spike (MS) and matrix spike duplicate (MSD) samples include two additional volumes of sample material collected in the field at the same time as an investigative sample (similar to field duplicate sampling), or may be collected by the laboratory from an existing investigative sample submitted from the field.

9. Record sample collection information on the field log and store the samples in an iced cooler according to the PFAS-free guidelines described herein and in the

Standard Operating Procedure for the Shipping and Handling of Samples.

10. Handle, pack, and ship samples according to the PFAS-free guidelines described herein and in Standard Operating Procedure for the Shipping and Handling of Samples.
    - Do not use chemical or blue ice.
    - Refresh with regular ice double bagged in Ziploc® bags
    - Chain of Custody should be bagged in Ziploc® storage bags and taped to the inside of the cooler lid.
    - The cooler should be taped closed with a custody seal and shipped by overnight courier.

V. EQUIPMENT DECONTAMINATION

Field sampling equipment used multiple times can become contaminated with PFAS. Decontamination procedures should be implemented to prevent cross-contamination.

The following procedures must be followed:

- Do not use Decon 90®
- Laboratory supplied PFAS-free water is preferred for decontamination.
- Water from any other sources, including public water supplies, used for any other purposes must be pre-determined to be PFAS-free.
- Deionized (DI) water will not be used to clean equipment due to the possible contamination from polytetrafluoroethylene material used in the DI water purification system.
- Alconox®, Liquinox® and Citranox® can be used for equipment decontamination.
- Sampling equipment can be scrubbed using a polyethylene or PVC brush to remove particulates.
- Decontaminated sampling equipment should be triple rinsed using PFAS-free water.

VI. EQUIPMENT-SPECIFIC SAMPLE COLLECTION PROCEDURES

See appropriate equipment- and medium-specific sample collection SOP and/or sampling equipment operation manual, as specified in the SAP or QAPP.

Table 1. PFAS-Free Guidelines.

PFAS-Free Guidelines (source: USEPA, DoD and ITRC)
Field Clothing and PPE: (see reference at bottom for acceptable products)
No clothing or boots containing Gore-Tex™
All safety boots made from polyurethane and PVC
No materials containing Tyvek®
Field crew has not used fabric softener on clothing
Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
Field crew has not applied unauthorized sunscreen or insect repellant
Field Equipment:
No Teflon® or LDPE containing materials on-site
All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene
No waterproof field books on-site
No plastic clipboards, binders, or spiral hard cover notebooks on-site
No adhesives (Post-It Notes) on-site
No Sharpies and permanent markers allowed; regular ball point pens are acceptable
No aluminum foil allowed
Keep PFAS samples in separate cooler, away from sampling containers that may contain PFAS
Coolers filled with regular ice only. No chemical (blue) ice packs in possession
Sample Containers:
All sample containers made of HDPE or polypropylene
Caps are unlined and made of HDPE or polypropylene
Wet Weather Gear:
Wet weather gear made of polyurethane and PVC only
Equipment Decontamination:
"PFC-free" water on-site for decontamination of sample equipment. No other water sources to be used.
Only Alconox and Liquinox to be used as decontamination materials
Food Considerations:
No food or drink on-site with exception of bottled water and/or hydration drinks (e.g., Gatorade, Powerade) that is available for consumption only in the staging area
Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

Table 2. Prohibited and Acceptable Items for Perfluorinated Compound (PFC) Field Investigations.

PPE, Clothing, Hygiene Products	PFC Concerns	Approved Alternative
Steel-toed boots	Boots may not contain Gore-Tex. Many waterproof boots are lined with Gore-Tex and are prohibited.	Steel-toed boots made with polyurethane and polyvinyl chloride (PVC)
Clothing	Water resistant, waterproof, or stain-treated clothing should be avoided. (EDQW 2016)	Clothing made of synthetic or natural fibers should be worn. Non-new cotton is preferred. Field gear should be laundered a minimum of six times prior to use, avoiding use of fabric softeners. Cotton overalls may be provided for use.
Rain Gear	Most rain gear is coated with a Gore-Tex lining and contains fluoropolymers.	Rain gear made from polyurethane and wax-coated materials may be worn (U.S. Navy 2015; EDWQ 2016).
Gloves	Nitrile gloves are specified for use in EPA Method 537.	Only nitrile gloves should be used. These should be changed often as outlined in EDQW 2016. Recommended powderless nitrile gloves.
Protective clothing	Fluoropolymer linings are used on Tyvek, Nomex, and Viton materials (U.S. Navy 2015; EDWQ 2016)	Avoid these materials. Select alternative protective clothing that does not contain fluoropolymers.
Sunblock and insect repellant	Many manufactured sun blocks and repellants contain PFCs.	Avoid use. If necessary, use of a 100% natural ingredient product may be used upon approval.
Cosmetics, moisturizers, hand creams, etc.	Many of these products contain surfactants and represent a potential source for PFCs.	Use of these products should be avoided prior to a sampling event. Acceptable products may include: ***Sunscreens*** - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are “free” or “natural” ***Insect Repellents*** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics ***Sunscreen and insect repellant*** - Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Food and drink	Food packaging often contains PFCs as a protectant from water and grease.	No food or drink shall be brought on-site, except for bottled water and hydration drinks. No blue ice packs should be used. Additionally, hands should be thoroughly washed following consumption of any wrapped fast food or pizza.

General Sampling Equipment and Field Supplies	Approved Alternative
Standard decontamination water or municipal water	Water from a known source that has been analyzed for PFCs and has been determined to be acceptable for the specific sampling program.
Decon 90 detergent	Alconox and Liquinox are the only detergents approved for decontamination (EDQW 2016)
Glass or Teflon-lined sampling bottles and lids	Polypropylene or high-density polyethylene (HDPE) sample bottles with an unlined polypropylene HDPE screw cap
Fluoropolymer tubing, valves, and other parts in pumps	HDPE and silicon materials (EDQW 2016)
Teflon tubing, bailers, tape, and plumbing paste	HDPE and silicon materials or disposable equipment
Pumps, packers, transducers, tubing, liners, valves, and wiring with polytetrafluorethylene or ethylene tetrafluoroethylene	Alternative materials
LDPE HydraSleeves	HDPE HydraSleeves (EDQW 2016)
Aluminum foil	Thin HDPE sheeting
Markers and waterproof pens	Non-waterproof pens (EDQW 2016)
Rite-in-the-rain paper, binders, and plastic clipboards	All field paperwork should be printed on standard paper and placed in a non-water-resistant folder or aluminum clipboard (EDQW 2016)
Post-It Notes	No Post-It Notes should be brought to the site
Chemical (blue) ice packs	Only regular ice should be used for refrigeration on site (EDQW 2016)

Table 2 References

Source Document - Groundwater and PFAS: State of Knowledge and Practice, Section 5: Field Sampling and Analysis, National Groundwater Association Press, 2017 – Draft Copy Not NGWA Board-approved, Not for circulation.

EDQW 2016. Bottle Selection and Other Sampling Considerations When Sampling for Per- and Poly-Fluoroalkyl Substances (PFAS). Revision 1.1.

U.S. Navy 2015a. Perfluorinated Compounds (PFCs) Interim Guidance/Frequently Asked Questions (FAQs). Memorandum from Commander, Naval Facilities Engineering Command, January 29, 2015.

U.S. Navy 2015b. Bureau of Medicine and Surgery, 2015. Testing for Perfluorochemicals (PFCs) in Drinking Water. Memorandum for Commander, Navy Medicine East.

SAMPLE COLLECTION FIELD LOG

Project Name:________________Project Code:___________Page __ of __

Date	Time	Sample ID	Sample Location	Equipment Used	Samplers	Comments (sample volumes, preservatives, descriptions, weather conditions, other observations, etc.)

Notes:

I. INTRODUCTION

Equipment cleaning areas will be located within or adjacent to a specific work area or as specified in the Health and Safety Plan. The equipment cleaning procedures described in this document include pre-field, in-field, and post-field cleaning of sampling equipment. The sampling equipment consists of soil sampling devices, well construction materials, ground-water sampling devices, water testing instruments, and other activity-specific sampling equipment. All non-disposable sampling equipment will be cleaned after completion of each sampling event. If appropriate, cleaning procedures will be monitored through the analysis of rinse blank samples as described in the project work plan or QAPP. **NOTE: If field activities involve per- and polyfluoroalkyl substances (PFASs) such as PFOS or PFOA, refer to the PFAS sampling SOP for additional measures which supersede this SOP.**

II. MATERIALS

The following materials will be available during equipment cleaning, as needed:

- Personal protection equipment (as required in the Health and Safety Plan);
- Distilled/de-ionized water;
- Non-phosphate detergent (Alconox, Liquinox, or equivalent);
- Tap water;
- Appropriate cleaning solvent (e.g., methanol, hexane, nitric acid);
- High-pressure hot water/steam cleaning unit;
- Wash basins;
- Brushes;
- Polyethylene sheeting;
- Aluminum foil;
- Plastic overpack drum, storage tub, or other suitable storage unit (for bladder or other pumps);
- Large heavy-duty garbage bags;
- Spray bottles (to hold tap water, distilled/de-ionized water, methanol, hexane, or nitric acid); and
- Disposable and/or heavy-duty reusable (PVC, latex or nitrile) gloves.

III. STORAGE OF EQUIPMENT

All cleaned sampling equipment will be stored in a clean environment and, where appropriate, the equipment will be covered/sealed with aluminum foil.

IV. SAFETY PROCEDURES DURING EQUIPMENT CLEANING

1. Personnel will wear the following personal protection equipment at a minimum, when cleaning sampling equipment (e.g., split-spoon sampler, trowels) and larger equipment (e.g., drill rig, augers):

- Safety glasses, goggles, or a splash shield; and
- PVC, latex, or nitrile outer gloves,
- Coated Tyvek® or Saranex® disposable coveralls or rain suit, optional for small equipment cleaning; and
- Chemical resistant over boots, optional for small equipment cleaning.

2. All solvent rinsing if required, will be conducted in an adequately ventilated area.
3. All solvents transported into the field will be stored and packaged in appropriate containers with care taken to avoid exposure to extreme heat.
4. Handling of solvents will be consistent with the manufacturer's Material Safety Data Sheets (MSDS).

V. FIELD CLEANING PROCEDURES

A. Cleaning Station

A designated field equipment cleaning station location will be established to conduct all cleaning at each work area of the Site. The field equipment cleaning station will be located away from the immediate work area to minimize adverse impacts from work activities on the cleaning procedures, but close enough so the sampling teams can minimize equipment handling and transport. All heavy equipment such as drill rigs and backhoes will receive an initial cleaning prior to use at the Site and will be cleaned again before leaving the site. The frequency of any additional cleaning will depend on the amount of use the heavy equipment receives and the extent of exposure to dirt and contaminants during the sampling event.

B. Cleaning of Smaller Sampling Equipment

Cleaning of smaller sampling equipment (e.g., split-spoon samplers, bailers, trowels) will be conducted according to the following sequential procedure:

- Non-phosphate detergent (Alconox, Liquinox, or equivalent) and tap water wash;
- Tap water rinse;
- Solvent rinse, if required (e.g., methanol or hexane for organic constituent analysis, nitric acid for inorganic constituent analysis); and
- Triple distilled/de-ionized water rinse.

The first step in decontamination is physical removal, where gross contaminants such as dust, soils and sediments can be removed through physical means such as wiping, scraping, shaking, and in some cases steam cleaning. Non-phosphate detergent and tap water scrub is intended to remove all visible particulate matter, residual oil and grease, and most but not all contaminants. Surfactants or detergents accumulate at the water to gas, solid, and oils interface, break the adhesive forces between the contaminant and the surface being cleaned, making the contaminants more soluble, allowing the contaminants to be washed away. The tap water rinse is necessary to remove all soapy residues and wash away loosened contaminants. The need for a specific solvent used for the solvent rinse, if required in the work plan or QAPP, will depend upon what the sample will be analyzed for and what contaminants are expected to be present. Some contaminants such as PCBs adhere to surfaces so tightly that a methanol or hexane rinse is required to break the adhesive bonds and adequately decontaminate the sampling equipment. Caution should be used when using solvent rinses to make sure that the chosen solvent is compatible with the sampling equipment and any PPE it will be used upon. It should be noted that most PPE constructed of organic materials could be damaged or dissolved by organic solvents such as alcohols, ethers, ketones, aromatics, straight chain alkanes and common petroleum products. The final rinse of distilled/de-ionized water will be repeated three times. Rinsing removes any remaining contaminants through dilution, physical attraction, and solubilization. The equipment will then be allowed to air dry.

C. Cleaning of Submersible Pumps

Submersible pumps may be used to evacuate stagnant groundwater from the well casing (e.g., air lift or turbine pumps) or to collect samples (e.g., bladder pump). The pumps will be cleaned and flushed between wells using an external detergent wash and tap water rinse. Steam cleaning may be substituted for pump casing, hose, and cables followed by a flushing with potable water through the pump and tubing or discharge hose. The cleaning process for development and purge pumps can be performed by pumping potable water from a clean plastic over-pack, drum or storage tub until a sufficient amount of water has been flushed through the system. The decontamination process for sampling pumps will consist of filling each of three clean suitable decontamination units sequentially with detergent water, tap water, and distilled/de-ionized water. Placing the sampling pump into each respective decontamination unit and pumping sufficient liquid from each unit through the sampling pump chamber and tubing if appropriate, to flush out any contaminants. It is recommended that disposable tubing be used whenever possible, thus reducing the amount of equipment and time needed for decontamination. In some cases, the chosen sampling pump (e.g. QED Micro Purge bladder pump) can easily be disassembled, decontaminated as individual small parts, disposable parts such as bladders and grab plates replaced and them reassembled for use. Such a pump, if appropriate for your sampling situation, would save time when cleaning and provide a more thorough decontamination, since all surfaces of the pump in which sample water has contact can be inspected, cleaned or replaced. If electric power pumps are used, care should be taken to avoid contact with the pump, well casing, pump reel and sample or purge water in direct contact with the pump, while the pump is running to avoid electric shock.

D. Cleaning of Heavy Equipment

Other equipment and materials, such as drill rigs, well casings, tools, and auger flights, associated with sampling events, will be cleaned prior to use. This equipment may retain chemical constituents from sources unrelated to the sampling site such as roadways, storage areas, or material from previous job sites that were not adequately removed. Heavy equipment will be thoroughly steam cleaned and/or manually scrubbed and rinsed upon arrival on site and when moved between sampling locations, as necessary. Drill rig items such as auger flights, wrenches, drill rods, and drill bits will also be cleaned before changing sample locations.

E. Collection and Disposal of used Solvents, Residuals and Rinse Solutions

All solvents, residuals, and rinse waters generated during the cleaning of equipment on-site will be collected, containerized, and stored on-site until arrangements can be made for proper disposal.

I. INTRODUCTION

Documentation of observations, conditions and generated data during field activities is an accepted scientific procedure and a critical component of any investigation. The rigorous documentation methods described in this SOP may be changed, as necessary, depending upon the needs of any particular investigation. Review the project work plans for any specific field documentation guidance. If changes are made to this SOP, document those changes in the field notes.

II. Methodology

- Use a new bound logbook for each project.
- Label logbook cover and binding with project name and code. Label inside cover with site information (name, address, contact(s), phone numbers, etc.). This will serve as a reference when performing fieldwork.
- Number each page of the logbook sequentially.
- All entries must be made in indelible ink (black is preferred because it copies well).
- All corrections or changes should be initialized, dated and marked with a circled error code. Any mistakes should be drawn through with a single line. Commonly error codes that may be used include: RE Recording Error, CE Calculation Error, SE Spelling Error, CL Changed for Clarity, WO Write Over.
- All entries should be accurate, factual, and unbiased. Never record an opinion.
- Notes should be detailed but concise.
- Notes should be written such that the day's activities can be reconstructed at a later date.
- Date the beginning of each day's notes.
- Use the 24-hour time format throughout the notes.
- Complete each day's notes with your signature.
- Maximize use of each line, crossing out gaps and blank pages so notes cannot be altered.
- Reference in the logbook when using other forms (e.g., boring logs, sampling forms, etc.).
- Return logbook to project manager upon completion of fieldwork.

III. Materials

The materials required for this SOP include the following:

- Bound field logbook(s).
- Field forms.
- Black waterproof/indelible ink pen(s).

IV. Items to include in a logbook

Field activities can vary widely. Entries in field logbooks will describe activities conducted and may include, but are not limited to, the following:

- Times of arrival and departure for ALL site personnel.
- Personnel on-site and affiliation (LTI and subcontractor, regulatory personnel, visitors/guests, and uninvited intruders).
- List of equipment used on-site (LTI and subcontractor).
- Detailed descriptions of daily activities.
- Locations of structures, features, utilities, etc.
- Conversations with client, contractor, regulatory agencies, office (changes to scope of work, health and safety

issues, and cost/payment issues are especially important).

- Weather conditions.
- Documentation of field instrument calibration.
- Documentation that photos were taken (include date/time of photo, photographer, site name/location, description of photo subject, compass direction taken, photo number).
- Sample collection and field measurement information including sample location, description, date/time, methodology, container types, preservatives, instrument type/serial number (reference applicable field form, if applicable).
- Wastes generated (containers, volumes, matrix, storage locations).
- Materials used (e.g., water sources, well materials, field reagents, construction materials).
- Deviations from intended scope of work.
- Deviations from SOPs if not already indicated in the work plan.
- Keep notes legible so others can read the logbook.

A bound logbook is the legal documentation of fieldwork performed at a site. Always remember that your notes may be used in litigation.