QUALITY ASSURANCE PROJECT PLAN ADDENDUM

SURFACE WATER SAMPLING IN UPPER AND LOWER MELVILLE PONDS

Rhode Island Department of Environmental Management
June 11, 2021

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3.0 Distribution List

Table 1: Distribution List

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4.0 Project Organization

This QAPP Addendum is generated under the Generic Lake QAPP (RIDEM 2011). It is anticipated the Generic Lake QAPP will be updated with minimal revisions in 2021. The Generic Lake QAPP is designed for generic application to all lake monitoring activities conducted by the RIDEM/OWR. All elements of the Generic Lake QAPP apply to this project, unless otherwise stated in this document. The NEPPS PPG Grant number applicable to this project is: BG99125708.

4.1 Project Organization Chart

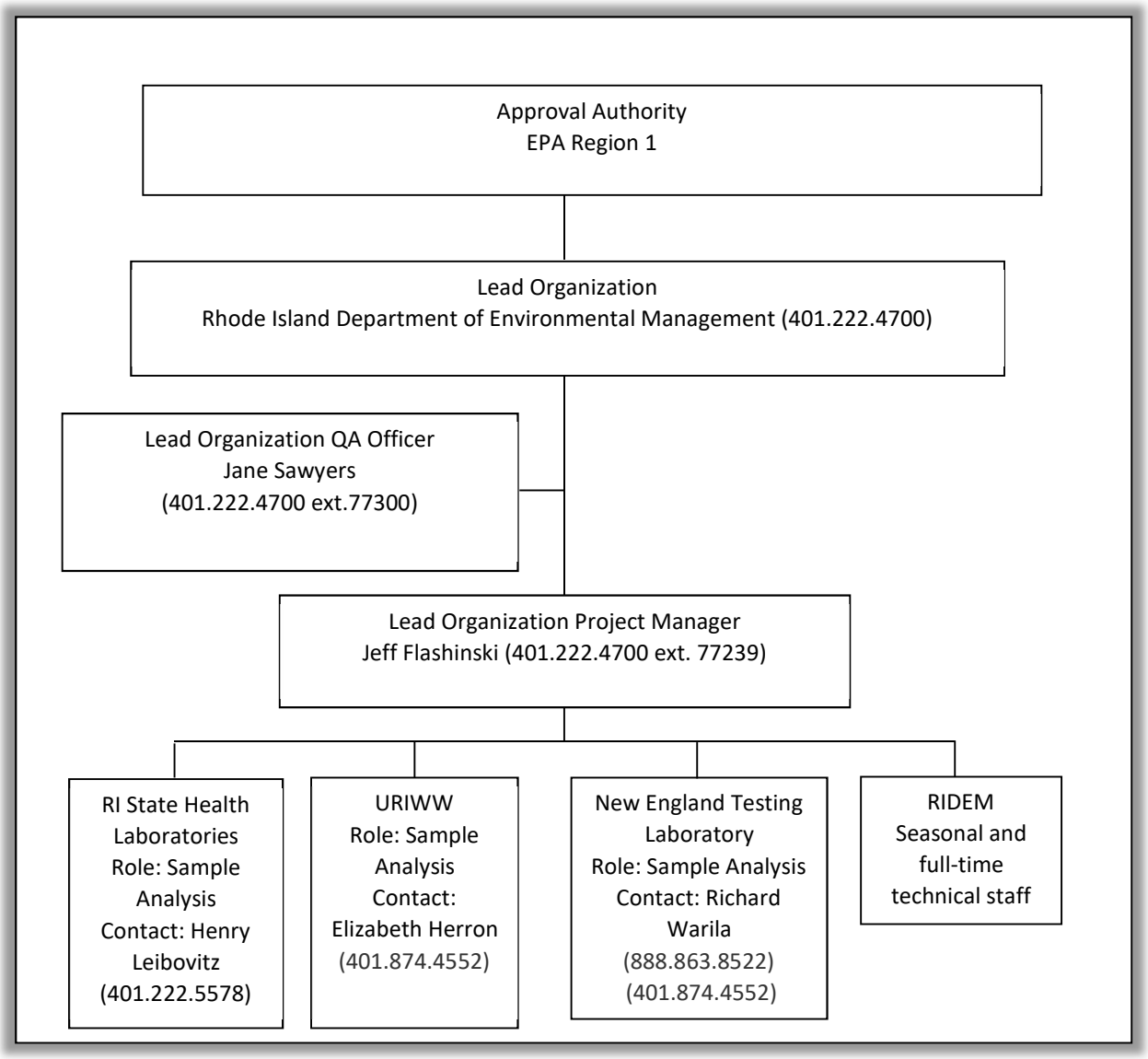


Figure 1: Project Organization Chart

4.2 Communication Pathways

Sampling in Upper and Lower Melville Ponds is scheduled to commence in early-mid May and continue, on a bi-weekly basis, thru mid-October 2021. This QAPP addendum covers the monitoring and data collection efforts required to develop TMDLs to address the existing total phosphorus (TP) impairments in Upper and Lower Melville Ponds. This Monitoring Plan sampling plan focuses on the collection of field and water quality data by the Rhode Island Department of Environmental Management's (RIDEM) Office of Water Resources TMDL Program. Field sampling including use of handheld YSI ProPlus sonde, secchi disc, and water sample collection will generally follow the protocols described in the Generic QAPP for Lake Monitoring (RIDEM 2011) and those found in EPAs National Lakes Assessment 2017 Field Operations Manual (https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100YX4L.txt).

The QA officer and project manager will meet either formally or informally as needed to communicate monitoring issues. Monitoring locations have been determined prior to the 2021 monitoring season. Changes to the sampling plan may occur during the sampling season. All changes made in the field will be documented in the field notes and discussed with the project manager. All changes to the Sampling Plan will be reported in the field notes and the final reporting package. The project manager is responsible for generating formatted data and the accompanied metadata and leading the seasonal/technical field staff in the field.

Sampling in Upper and Lower Melville Pond will include collection of water samples for chlorophyll-*a* and nutrient (N, P) analysis. The laboratories used are described in this Sampling Plan and the project manager will coordinate the arrangements with the laboratories. As needed, the project manager will consult with contacts at both laboratories regarding bottle collection, sample submission, and any logistical or analytical issues that arise during the monitoring period.

The Project Manager will contact the personnel directly associated with this survey in advance of anticipated survey dates. Prior to the survey, the Project Manager will contact New England Testing Laboratory and the RI State Health Laboratory to arrange for sample bottles. These bottles will be kept at RIDEM and will be used for all sampling activities with the exception of the biological sampling. Prior to sampling the Project Manager will obtain necessary supplies for chlorophyll sampling and filtering, as well as sample pickup and submission.

4.3 Training

All personnel associated with this survey will be given a Monitoring Plan that outlines the station locations and sampling protocol before sampling begins. If necessary, the field personnel will also be given a tour of the sampling locations prior to the commencement of the survey. The Project Manager will detail the protocol for each station during the sampling station tour.

In addition, for those unfamiliar with the equipment being used, training will include an introduction to all possible sampling equipment. The Project Manager will keep a list of all individuals trained. This list will include the names of the individuals trained, who trained them, and the date.

5.0 Problem Definition/Background

Both Upper and Lower Melville Ponds currently have a single waterbody ID (RI0007029L-01) and are Class A waterbodies located entirely within the Town of Portsmouth (Figure 2 and Figure 3). RIDEMs water quality classification for the Melville Ponds is Class A. Designated use goals associated with this classification include fish and wildlife habitat, fish consumption, and primary and secondary contact recreation.

The headwaters begin in Melville Upper Pond (known locally as Thurston Gray Pond), just south of Bradford Avenue. From here water flows north under Bradford Avenue then west through a series of smaller ponds before finally reaching Melville Lower Pond by the coast, east of Alexander Road and south of Cromwell Drive. The Melville Ponds outlet to the northwest via an unnamed tributary to Narragansett Bay. The land use directly surrounding this series of ponds is mostly forest with a small portion of residential.

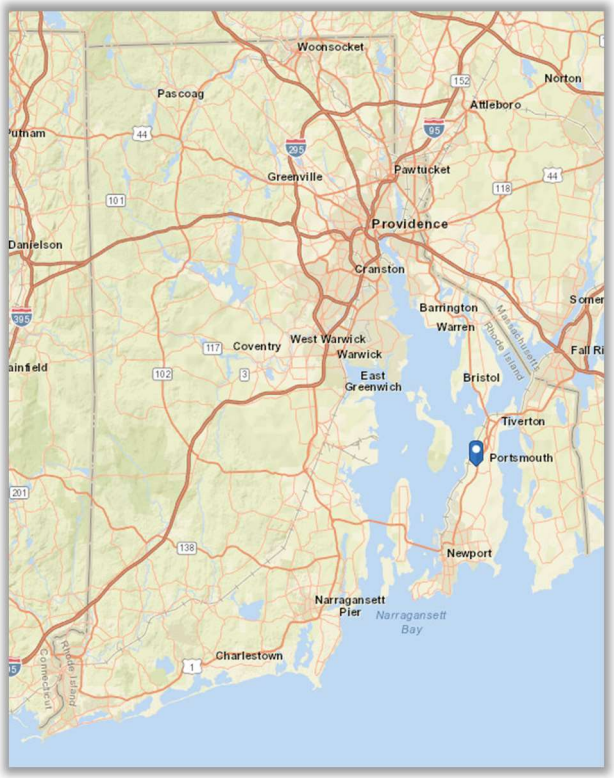


Figure 2: Melville Ponds (Blue Marker)

Both Upper and Lower Melville Ponds have experienced significant cyanobacteria blooms since RIDEM began evaluating the ponds in 2012. Oftentimes the existence of these blooms necessitates the issuance of a recreational health advisory which recommends no contact with the ponds. Both ponds receive heavy recreational fishing use and are stocked with trout. Stocking is cancelled if a health advisory is issued, which causes consternation with the public. The dominant genera of cyanobacteria generally include *Anabaena, Aphanizomenon, and Microcystis.* Elevated levels of the cyanotoxin microcystin have also been documented.

Figure 3: Upper and Lower Melville Ponds, Portsmouth, RI

A summary of available data for Melville Ponds is presented below. These data were collected by volunteers with the University of Rhode Island Watershed Watch (URIWW) Program. For Upper Melville Pond, data are available from a single, mid-pond surface station from 1997-2019. No recent data exists for Lower Melville Pond. Evaluation of existing data confirm the 303(d) phosphorus impairment for Upper Melville Pond. Table 2 summarizes nutrient-related data with Carlson's Trophic State Index (TSI) calculations (Carlson 1977) and limiting nutrient summaries. A TN:TP ratio >17 generally indicates phosphorus limitation. A TSI value of 58.0 for this index is designated as eutrophic.

Table 2: Nutrient, Chl-a, and Secchi Disc Summary for Upper Melville Pond

Year	Avg Chl-a (µg/L)	Avg Secchi (m)	Avg TP (µg/L)	Avg TN (µg/L)	TN:TP ratio
1997	17.0		79.7	1323	16.6
1998	7.2		45.7	1030	22.6
1999	7.1	1.33	36.0	1233	34.3
2000	6.7	1.92	35.3	887	25.1
2001	9.7	1.60	36.7	913	24.9
2002	21.6	1.51	39.8	1293	32.5
2003	13.2	1.77	16.0	1242	77.6
2004	23.4	1.60	29.0	1520	52.4
2005	20.0	2.10	41.0	1163	28.4
2006	16.4	1.95	31.7	690	21.8
2007	41.0	1.47	52.0	1570	30.2
2008	23.1	1.69	63.7	1440	22.6
2009	17.6	1.79	42.0	1480	35.2
2010	30.9	1.28	60.7	1210	19.9
2011	16.8	1.60	41.7	1080	25.9
2012	42.9	1.29	62.3	1365	21.9
2013	31.3	1.66	32.0	1010	31.6
2014	34.3	1.57	48.3	1419	29.4
2015	25.8	1.37	52.0	1420	27.3
2016		1.28	52.0	1228	23.6
2017	14.7	1.03	51.0	1438	28.2
2018	39.6	1.11	64.7	2062	31.9
2019	17.6	1.35	47.3	1313	27.7
AVG	21.7	1.5	46.1	1275	30.1
TSI	61	54	59	**Carlson TSI**	58.0

5.1 Goals/Objectives of Monitoring Data

The goal of data collection activities associated with this sampling will be to collect high-quality information and water chemistry data that will be used to develop total phosphorus TMDLs for both ponds.

The objective of the field monitoring is to collect the following information in both ponds on a bi-weekly basis:

1) temperature, dissolved oxygen, and specific conductance,

2) secchi disc depth measurements, and

3) collection of water samples for nutrient analysis including total and ortho-phosphorus, nitrate-nitrite nitrogen, ammonia nitrogen, and total Kjeldahl nitrogen.

6.0 Project Description and Schedule

Tentative sampling dates (week of) are shown in Table 3 but dates may change based on weather/safety related and/or staffing issues. It is anticipated that data collection and sampling of both ponds can be accomplished within a single day. This will also include transportation of samples to appropriate laboratories. If this is not possible, either extra staff or time will be allocated to complete the sampling.

Table 3: Melville Ponds Tentative Sampling Schedule - Week of:

May 17	June 14	July 12	Aug 16	Sept 13	Oct 11
May 31	June 28	July 26	Aug 30	Sept 27	

6.1 Project Objective

The objectives of the field sampling and sample collection/analysis is to fill data gaps and provide critical information needed for TMDL development. The specific objectives of this monitoring are to obtain an additional year of water chemistry and field data that will be used to add to the existing dataset used to develop the TMDLs for Upper and Lower Melville Ponds.

The schedule for the proposed tasks, including laboratory analysis and a final data report are shown below in Table 4.

Table 4: Proposed Project Schedule

Task	Deliverable	2021							2022		
		M	J	J	A	S	O	N	D	J	F
QAPP Preparation	QAPP Document										
Sample Collection	NA										
Laboratory Analysis	Laboratory Reports										
Final Data Report	Final Data Report										

7.0 Project Quality Objectives and Measurement Performance Criteria

Collecting high quality data is one of the most important goals of this project. Specific data quality objectives include method detection limits, precision, accuracy, representativeness, comparability, and completeness. All the data quality objectives will be met if the data collected are useful in developing total phosphorus TMDLs for Upper and Lower Melville Ponds.

7.1 Data Quality Objectives and Measurement Performance Criteria

Data Quality Objectives (DQOs) are qualitative and quantitative statements that clarify the intended use of the data, define which purposes the data may be used for, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. DQOs delineate the type of data needed to support decisions, identify the conditions under which the data should be collected, and state what requirements must be met in order to use the data for its intended purpose. If applicable,

the DQOs should specify the tolerable limits of the probability of making a decision error because of uncertainty in the data.

For the Upper and Lower Melville Pond project, the intended purpose of the data collection and analysis is to develop EPA approvable total phosphorus TMDLs. This QAPP deals specifically with the data quality objectives during data collection and outlines the proper collection methods, procedures, and measurements to be utilized to reduce sources, magnitude, and frequency of errors during data generation. By outlining and following these steps, uncertainties in the data will be reduced and data quality will be assured for proper use and interpretation of the data. To meet the data quality objectives, the following quality assurance measures will be employed to verify the use of proper, consistent field procedures, handling measures, and laboratory analyses.

- Standard Operating Procedures (SOPs) will be implemented during sampling and field data collection.
- EPA-approved, standardized methods will be adhered to for all chemical analysis procedures.
- Qualified, trained scientists will perform the sample collection and laboratory analyses.
- Chain of Custody forms will be completed when handling samples and transferring custody from field crew to all analytical laboratories.
- One trip blank (bottles filled with de-ionized water) per round of sampling will be transported by each field crew to ensure there is not contamination of sampling containers in the field during transport.
- Field duplicate samples are collected to ensure the reproducibility of results. If two samples are taken of the same water, under the same conditions, the data generated from those two samples should theoretically be the same. Duplicates allow the analyst to quantify the error involved in sampling (the difference between the value obtained and "reality"). When a sample is taken and another is taken right after, the sample is referred to as a sequential duplicate. These samples do not gather data under the exact same conditions; therefore, there may be a difference in the values. Analysis of sequential samples allows the analyst to quantify the error involved in filling bottles sequentially. For this project, a sequential duplicate will be taken once every other sampling date.

Data Quality Indicators

Data quality indicators (DQI) are the quantitative statistics and qualitative descriptors used to evaluate data quality and interpret the degree of acceptability of data to the user. The principal data quality indicators are: precision, accuracy, sensitivity, bias, representativeness, completeness, and comparability. To determine that the data meet the project's quality objectives, the data quality indicators are compared against predetermined standards deemed *measurement performance criteria* as discussed below for each DQI.

All samples collected and/or submitted to an analytical laboratory will be subject to that laboratory's data quality objectives and criteria. The Project Manager will communicate to all analytical laboratories the acceptable measurement performance criteria required for the data to meet project-specific data quality objectives. Contractual laboratory QAPPs or SOPs are

referenced in this QAPP. All laboratory procedures for water sample analysis will follow the guidelines for data quality objectives and criteria outlined in each laboratory's QAPP/SOP. Any changes to this should be discussed with the Project Manager.

Precision

Precision is a measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, expressed generally in terms of the standard deviation (USEPA 2002). At 10% of monitoring locations, a set of duplicate water samples will be collected. For field measurements, at least 10% of monitoring locations will include the repeated measurement of each parameter by the same analyst using the same equipment and technique. For field measurements, refer to the respective SOP for procedure of repeated measurements and acceptable limits. Precision of duplicate sample analyses run in a contracted laboratory will be assessed with a relative percent difference (RPD), and an RPD greater than 20% will require the water sample to be reanalyzed. If the data from the duplicate samples are not within the acceptable RPD range, the data will not be used from these samples.

Accuracy

Accuracy is the overall agreement of a measurement to a known value and includes error from both bias (systematic error) and precision (random error) (USEPA 2002). The accuracy of electronic field equipment will be checked according to manufacturer's specification to known values or standards. The accuracy of all other field equipment will be assured by comparison with known standards in the field (i.e., secchi depth determined by a tape measure instead of markings on the rope). For water collections, one (1) trip blank (sample bottles filled with deionized (DI) water in the lab) for each bi-weekly sampling event will be transported by the field crew for laboratory analyses to ensure there is no contamination of sampling containers during transport.

The accuracy of each laboratory method is established by the laboratory calibration and use of its pre-determined method detection limit (MDL) and quantitation level (QL). The QL is the minimum concentration of a substance that can be reliably identified, measured, and reported with confidence it is accurate. The MDL is the lowest concentration of a substance that can reliably be measured and reported with some degree of confidence that the substance is present in the sample.

Bias

Bias is the persistent influence of a measurement process that causes error in one direction (USEPA 2002). All field analysts will be trained to use the field equipment with the same SOPs to reduce operator bias. The use of trip blanks and duplicate samples will be used to assess sampling, transportation, and laboratory bias due to contamination. The acceptability of all constituent concentrations will be evaluated using reagent and procedural blanks. The results of the trip and procedural blanks will be reported with the data results.

Sensitivity

The method and instrument detection limits are addressed by the range of measurements capable by the equipment used. Information regarding this is presented in the field SOP for the YSI ProPlus.

Completeness

Completeness is the measure of valid data obtained from sampling. At a minimum, the project should require that 90% of the data received to be collected, analyzed, and judged valid for completeness to be achieved. If the project team or requirements of the project determine that a percentage greater than 90% should be achieved for completeness, this will be indicated in the project-specific addendum. If completeness is not met, statistical procedures, including power analysis, and best professional judgment will be used to determine whether use of the remaining data will produce correct data interpretations and conclusions.

Data Comparability

To maximize the quality of the data collected, and to collect data that is comparable with other studies, accepted sampling procedures will be used during this study. All samples collected will be sent to laboratories that use standard methods.

Representativeness

The representativeness of sample collection is, in part, determined from information gleaned from the vertical profiling. For ponds, a single sampling station (usually located at the deepest point of the lake) is generally considered representative for the entire lake. A minimum of 90% of samples should meet the specific conditions required for the project to be considered representative of the water quality conditions the project is designed to examine.

Measurement performance criteria for all parameters are described below in Tables 5-10.

Table 5: Measurement Performance Criteria: Nitrate and Nitrite Nitrogen

SOP	RIDOH SOP WL16 nitrate rev. 4 and RIDOH SOP WL56 rev 5 nitrite			
Medium/Matrix	Surface Water			
Analytical Parameter	**Nitrate -Nitrite -N**			
Concentration Level	<0.05 mg/L			
Data Quality Indicator	**Analytical Method/ SOP Reference/ Laboratory**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S/A)**
Precision	EPA 353.2	<20%RPD	Lab Duplicates	A
Accuracy/bias Contamination	EPA 353.2	<0.05 mg/L	Method Blank	A
Accuracy/bias Contamination	EPA 353.2	90 -110% R	Laboratory Fortified Blank Sample -LFB	A
Data - Completeness	EPA 353.2	Data collected are determined to be useable	Anticipate 100%	A
Accuracy	EPA 353.2	<20%RPD	Field Duplicates	S/A

Table 6: Measurement Performance Criteria: Ammonia Nitrogen

SOP	NETL Laboratory SOP 40_0024L			
Medium/Matrix	Surface Water			
Analytical Parameter	**Ammonia Nitrogen**			
Concentration Level	0.01 mg/L			
Data Quality Indicator	**Analytical Method/ SOP Reference/ Laboratory**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S/A)**
Precision	EPA 350.1 Rev. 2.0	<20%RPD	Lab Duplicates	A
Accuracy/bias Contamination	EPA 350.1 Rev. 2.0	0.01 mg/L	Method Blank	A
Accuracy/bias Contamination	EPA 350.1 Rev. 2.0	80 -120% R	Laboratory Control Sample -LCS	A
Data - Completeness	EPA 350.1 Rev. 2.0	Data collected are determined to be useable	Anticipate 100%	A
Accuracy	EPA 350.1 Rev. 2.0	<20%RPD	Field Duplicates	S/A

Table 7: Measurement Performance Criteria: Total Kieldahal Nitrogen

SOP	NETL Laboratory SOP 40_0019B			
Medium/Matrix	Surface Water			
Analytical Parameter	**Total Kjeldahl Nitrogen**			
Concentration Level	0.20 mg/L			
Data Quality Indicator	**Analytical Method/ SOP Reference/ Laboratory**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S/A)**
Precision	EPA 351.2	<20%RPD	Lab Duplicates	A
Accuracy/bias Contamination	EPA 351.2	0.2 mg/L	Method Blank	A
Accuracy/bias Contamination	EPA 351.2	80 -120% R	Laboratory Control Sample -LCS	A
Data - Completeness	EPA 351.2	Data collected are determined to be useable	Anticipate 100%	A
Accuracy	EPA 351.2	<20%RPD	Field Duplicates	S/A

Table 8: Measurement Performance Criteria: Total Phosphorus

SOP	RIDOH SOP WL12 rev. 3			
Medium/Matrix	Surface Water			
Analytical Parameter	**Total Phosphorous**			
Concentration Level	<0.01 mg/L			
Data Quality Indicator	**Analytical Method/ SOP Reference/ Laboratory**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S/A)**
Precision	SM 4500 P E	<20%RPD	Lab Duplicates	A
Accuracy/bias Contamination	SM 4500 P E	<0.02 mg/L	Method Blank	A
Accuracy/bias Contamination	SM 4500 P E	90 -110% R	Laboratory Fortified Blank Sample -LFB	A
Data - Completeness	SM 4500 P E	Data collected are determined to be useable	Anticipate 100%	A
Accuracy	SM 4500 P E	<20%RPD	Field Duplicates	S/A

Table 9: Measurement Performance Criteria: Ortho-Phosphorus

SOP	RIDOH SOP WL17 rev. 3
Medium/Matrix	Surface Water
Analytical Parameter	**Dissolved Phosphorus**
Concentration Level	<0.02 mg/L

Data Quality Indicator	**Analytical Method/ SOP Reference/ Laboratory**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S/A)**
Precision	SM 4500 P E	<20%RPD	Lab Duplicates	A
Accuracy/bias Contamination	SM 4500 P E	<0.02 mg/L	Method Blank	A
Accuracy/bias Contamination	SM 4500 P E	90 -110% R	Laboratory Fortified Blank Sample -LFB	A
Data - Completeness	SM 4500 P E	Data collected are determined to be useable	Anticipate 100%	A
Accuracy	SM 4500 P E	<20%RPD	Field Duplicates	S/A

Table 10: Measurement Performance Criteria: Chlorophyll-a

QC Sample and/or Activity Used to Assess Measurement Performance	**Measurement Performance Criteria**	**Data Quality Indicators (DQIs)**
Method Blank	Not greater than 0.03 µg/L chlorophyll-a as read on the fluorometer	Bias
Filter Blank	Not greater than 0.03 µg/L chlorophyll-a as read on the fluorometer	Bias
Sample Replication of Fluorometer Reading	Not greater than 20% RPD	Precision
Calibration Check Using Liquid and Solid Standards	Not greater than 15% Difference	Accuracy
LCS (Calibration Check Using Solid Standard)	Not greater than 15% Difference	Accuracy/Precision

8.0 Sampling Process Design

This section describes the sampling system in terms of what media/matrices will be sampled, where the samples will be taken, the number of samples to be taken and the sampling frequency.

8.1 Sampling Design Rationale

General data acquisition at each site (see Figure 4) includes:

1. The collection of temperature, dissolved oxygen, and specific conductance in the water column (in increments of feet), at the deepest point/location of each pond, using a YSI ProPlus or 2030 series sonde. This information will be used to evaluate seasonal vertical changes in temperature, dissolved oxygen, and specific conductance and determine the existing stratification status which will then guide in-situ water sample collection.

2. The collection of secchi disc depth at the deepest point/location of each pond.

3. The collection of water samples (per results from step 1) using a combination of a 2 meter integrated sampling device and a Van Dorn sampler.

    - If stratification is not evident:
        - samples for nutrient (total and dissolved phosphorus, TKN, nitrate-nitrate nitrogen, and ammonia nitrogen) and chlorophyll-a analysis should be collected in the upper part of the water column with the vertically integrated sampler.

    - If profiling data indicate thermal stratification and/or low dissolved oxygen (< 2.0 g/l):
        - samples for nutrient (total and dissolved phosphorus, TKN, nitrate-nitrate nitrogen, and ammonia nitrogen) and chlorophyll-a analysis should be collected in the epilimnion with the vertically integrated sampler, and

        - a Van Dorn sampling device will be used to collect a water sample from the hypolimnion (using a Van Dorn sampling device) for nutrient (total and dissolved phosphorus, TKN, nitrate-nitrate nitrogen, and ammonia nitrogen) analysis.

All field SOPs associated with this sampling will follow those in the RIDEM Generic QAPP for Lake Monitoring (2011), RIDEM established SOPs, and those found in EPAs National Lakes Assessment 2017 Field Operations Manual (https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100YX4L.txt). Analytical SOPs for collected water samples are sourced from the RI State Health Laboratory Center for Environmental Sciences (total and dissolved phosphorus analysis, NO3-NO2), New England Testing Laboratory (for TKN and ammonia nitrogen) and the University of Rhode Island Watershed Watch Program (chlorophyll-a analysis).

Water samples collected during the study will be analyzed for total phosphorus, ortho-phosphorus, ammonia nitrogen, nitrate-nitrite nitrogen, total Kjeldahal nitrogen, and chlorophyll *a*. Total nitrogen will be calculated from the analyzed nitrogen constituents.

Figure 4: Sample Location for Upper and Lower Melville Ponds

9.0 Field Sampling Standard Operating Procedures

Field sampling standard operating procedures (SOPs) used for this study are referenced below in Table 11. The following field sampling SOPs are provided as attachments to this QAPP:

FSOP1- Digital Depth Finder
FSOP1a-Digital Depth Finder
WR-W-7- Secchi Disc Depth
WR-W-34- YSI Professional Plus
WR-W-32- Surface Water Sample Collection
WR-W-46- Van Dorn Sampling Device
FSOP6- Integrated Water Sampling Device

Table 11: Project Sampling SOP Reference Table

Reference Number/Title	Originating Organization	Equipment ID	Modified for Work Project
Field Sampling SOP FSOP-1 and FSOP-1a **Digital Depth Finder**	RIDEM	Depthmate Model SM-5	No
Field Sampling SOP WR-W-7 **Secchi Disc Measurements**	RIDEM	NA	No
Field Sampling SOP WR-W-34 **YSI ProPlus**	RIDEM	YSI ProPlus Multi-Parameter Meter	No
Field Sampling SOP WR-W-32 **Surface Water Sample Collection**	RIDEM	NA	No
Field Sampling SOP WR-W-46 **Van Dorn Sample Collection**	RIDEM	NA	No
FSOP-6 **Integrated Sampling Device SOP**	https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100YX4L.txt See Section 5.5 (pages 38-41) National Lakes Assessment Field Manual		

Upon arrival at the desired sampling location in each pond using light craft (canoe, kayak, or small jon boat), RIDEM staff will perform field activities in the following order (with all information being recorded in a field notebook):

- Take soundings with the digital depth finder to confirm deepest spot sample location.
- Set anchor and secure field equipment. The anchor will be lowered slowly to avoid disturbing the bottom.
    - If the bottom is disturbed, the field team should record this in the field notebook and relocate a reasonable distance before continuing sampling.
- Record field observations, including weather information, and take pictures.
- Perform secchi depth readings.
- Conduct vertical profiling (temperature, specific conductance, dissolved oxygen and evaluate data.
    - Determine sampling protocol (Section 8.1).
- Commence collection of water samples per Section 8.1 and FSOP's-04-06.
    - Samples for water quality analysis should be collected from a location in the boat as far as reasonable from where the anchor is set. Secchi depth should take place on the shaded side of the boat.

9.1 Equipment Calibration, Cleaning, and Maintenance

The Project Manager and appropriate project staff shall ensure that all field equipment is calibrated and maintained properly. The Project Manager will ensure that all field sampling equipment are maintained according to the manufacturer's instructions. Table 12 provides an overview of sampling equipment calibration and maintenance.

Table 12: Sampling Equipment and Field Analytical Calibration/Maintenance Table

EQUIPMENT	**Activity**	**Frequency**	**Acceptance Criteria**	**Corrective Action**	**SOP Reference**
Depth-mate Model SM-5	Clean Transducer Surface	Once before Sampling or as needed	Visibly free of non-conductive grease or oils	Clean Transducer Surface	FSOP1, FSOP-1a and Manual
Depth-mate Model SM-5	Check Batteries	Once before sampling or as needed	Display is visible when switch is held down	Replace Batteries	FSOP1, FSOP-1a and Manual
Secchi Disc	Ensure Disc is appropriately connected to rope	Proir to sampling	Appropriate connection	Appropriate action	WR-W-7
Integrated Water Sampler	https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100YX4L.txt				EPA NLA 2017 Field Operations Manual
YSI Pro-Plus	Check Batteries	Prior to sampling	See FSOP3	See FSOP3	WR-W-34 and manual
YSI Pro-Plus	Calibration-barometric pressure, specific conductance, pH, temperature	Once per week	See FSOP3	See FSOP3	WR-W-34 and manual
YSI Pro-Plus	Calibration-dissolved oxygen	Once per day	See FSOP3	See FSOP3	WR-W-34 and manual
Van Dorn Sampler	Check integrity of sampler (hoses, clamps, ropes, rubber/silicone parts, wires, stoppers are functioning properly)	Prior to sampling	Sampler works appropriately and inspection reveals no problems	Repair as needed	WR-W-46

9.2 Inspection and Acceptance Requirements for Sample Containers/Bottles

The Project Manager shall ensure that all sample bottles/containers are acceptable for use. The State Health Laboratory, New England Testing Laboratory, and the University of Rhode Island Watershed Watch Laboratory will all provide appropriate sampling bottles as required for each sampling run. The Project Manager shall appropriately maintain this bottle supply. A log shall be kept in the project notebook documenting receipt and labeling of each sample bottle. Reference is also made to the appropriate SOP attached to this document for each constituent and respective laboratory.

The Project Manager shall maintain a field notebook for all field notes. The Project Manager shall also record any changes to the sampling locations or number of stations and the reason thereof. The Project Manager will transfer any applicable data from the field notebook to either excel spreadsheets or word documents as required.

9.3 Sample Identification

All sample bottles will be appropriately labeled in the field by RIDEM staff. The pond name, sample type (i.e., total phosphorus, TKN, etc.), depth (denoted e-epilimnion and h-hypolimnion (with depth)), date, time and initials shall be filled in prior to sampling using a permanent marker. To an extent, sample identification will be determined by each analytical laboratory's chain of custody format.

9.4 Sample Handling, Storage, Preservation, Holding Time, and Tracking

All samples will be capped tightly stored in coolers on ice. Sampling containers, sample preservation, and sample holding time requirements are detailed in Table 13. Sample tracking is accomplished via Chain of Custody forms. Copies of these forms are provided in Appendix A. The Project Manager or a designee shall deliver the samples to the appropriate laboratory for analysis. Samples for chlorophyll-a analysis will be filtered at the RIDEM Sampling Center in Providence upon the completion of sampling. They will then be stored in a freezer until they can be transported to the URI Watershed Watch Laboratory. Samples for ammonia nitrogen and TKN will be submitted to the State Health Laboratory, which then delivers them to the New England Testing Laboratory (NETL).

Table 13: Water Sampling Requirements

Parameter	Lab	Container Type[1]/ Preparation	Typical Sample Volume	Sample Preservation	Holding Time
Chlorophyll-a	URI Watershed Watch Laboratory	2-250ml plastic	500-ml	none	6 months
Nitrate and Nitrite-Nitrogen (NO3)	State Health Laboratory	250ml PPE	250ml	H2SO4	28 days
Ammonia Nitrogen (NH3-N)	NETL	16-oz plastic	500ml	H2SO4	28 days
Total Kjeldahl Nitrogen	NETL	16-oz plastic	500ml	H2SO4	28 days
Total Phosphorus	State Health Laboratory	500ml PPE	500ml	H2SO4	28 days
Orthophosphate	State Health Laboratory	½ gallon jug	1.89L	none	48 HRs

[1]The laboratory that completes the sample analysis will provide appropriate bottles.

9.5 Laboratory Analytical Services

Analytical services will be provided by 1) RI State Health Laboratory in Providence, RI, 2) New England Testing Laboratory (NETL) in Cranston, RI and, 3) The University of Rhode Island Watershed Watch Laboratory in South Kingstown, RI.

9.6 Analytical Methods

All applicable laboratory analytical methods and achievable laboratory limits are summarized below in Table 14 and the full laboratory SOPs (LSOP) are provided in Appendix C.

Table 14: Upper and Lower Melville Pond Laboratory Analytical Parameters

Parameter	Analytical Method/	Detection Limit, accuracy, precision	Instrument	Analytical Laboratory	Laboratory SOP (LSOP) Reference
Chlorophyll-a	MDL-0.1 ug/l RL- 0.2 ug/l	NA – Samples filtered in field, then kept frozen until analyzed by the URIWW Laboratory	Flourometer-Turner Designs Trilogy	URI Watershed Watch	LSOP012
Nitrate and Nitrite-Nitrogen (NO3)	EPA 353.3/353.2	MDL= 0.007mg/L MRL=0.05 mg/L	Lachat 8000 Quick Chem System	RI State Health Laboratory	EPA 353.2 Nitrate as N by FIA, #1322
Nitrate and Nitrite-Nitrogen (NO3)	EPA 353.3/353.2	MDL=0.046 mg/L MRL=0.05 mg/L	SEAL AQ 400 Discrete Autoanalyzer	RI State Health Laboratory	EPA 353.3 Nitrate as N by SEAL AQ400, #13312
Ammonia Nitrogen (NH3-N)	SM 4500NH3 D	0.1 mg/l	Ion Selective Probe	MPA Lab- New England Testing Laboratory	SOP 428-TKN rev010
Total Kjeldahl Nitrogen	SM 4500NH-3-D	0.1 mg/l	Ion Selective Probe	MPA Lab- New England Testing Laboratory	SOP 403-Ammonia rev015
Total Phosphorus	EPA 365.1	MDL=0.003 mg/L MRL= 0.01mg/L	Lachat 8000 Quick Chem System	RI State Health Laboratory	EPA 365.3 Phosphorus by Flow Injection Analysis Colorimetry, #1328
Orthophosphate	EPA 365.1	MRL=0.010 mg/L	Lachat 8000 Quick Chem System	RI State Health Laboratory	EPA 365.3 Phosphorus by Flow Injection Analysis Colorimetry, #1328

Fixed laboratory analytical quality control requirements for all analytical parameters are given in Tables 15-20.

Table 15: Fixed Laboratory Analytical QC – Chlorophyll-a

LAB SOP	LSOP 012
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Chlorophyll a
Concentration Level	Low to high
Analytical SOP	See Table 14
Laboratory	URI Watershed Watch

Laboratory QC	Frequency /Number	Method/SOP QC Acceptance Limits	Corrective Action (CA)	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 for every ≤ 38 samples	≤0.03 µg/L on fluorometer	Track solid standard LCS values to note drift; purchase additional liquid standard to compare against.	URIWW staff	Bias	≤0.03µg/L on fluorometer
Filter Blank	1 for every ≤ 38 samples	≤0.03 µg/L on fluorometer	Re-analyze on fluorometer, then qualify samples associated with blank if necessary	URIWW staff	Bias	≤0.03µg/L on fluorometer
Storage Blank	NA					
Instrument Blank	NA					
Laboratory Duplicate	NA					
Laboratory Matrix Spike	NA					
Matrix Duplicate Spikes	NA					
LCS	1 for every ≤ 38 samples	≤ ±15%	Re-analyze on fluorometer, check value of primary standard, re-calibrate if necessary, re-analyze associated samples	URIWW staff	Accuracy	≤ ±15%
LFB	NA					
Surrogates	NA					
Internal Standards (ISs)	NA					

Table 16: Fixed Laboratory Analytical QC – Total Kjeldahl Nitrogen

LAB SOP	SOP 428 – TKN rev010
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Total Kjeldahl Nitrogen
Concentration Level	0.1 mg/L – 50.0 mg/L
Analytical SOP	See Table 9.4
Laboratory	NETL

Laboratory QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action (CA)	Person (s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per batch	TA ≤ QL	Reanalyze batch	Laboratory Manager	Accuracy /Bias-Contamination	TA ≤ QL
Reagent Blank	NA	NA	NA	NA	NA	NA
Storage Blank	NA	NA	NA	NA	NA	NA
Instrument Blank	NA	NA	NA	NA	NA	NA
Laboratory Duplicate	1 per batch	RPD < 20%	Qualify Data	Laboratory Manager	Precision	RPD < 20%
Laboratory Matrix Spike	1 per batch	80-120%	Qualify Data	Laboratory Manager	Accuracy	80-120%
Matrix Duplicate Spikes	NA	NA	NA	NA	NA	NA
LCS	1 per batch	80-120%	Reprep /Reanalyze	Laboratory Manager	Accuracy	80-120%
LFB	NA	NA	NA	NA	NA	NA
Surrogates	NA	NA	NA	NA	NA	NA
Internal Standards (ISs)	NA	NA	NA	NA	NA	NA

Table 17: Fixed Laboratory Analytical QC – Ammonia Nitrogen

LAB SOP	SOP 403 – Ammonia rev015
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Ammonia Nitrogen
Concentration Level	0.1 mg/L – 5.0 mg/L
Analytical SOP	See 14
Laboratory	NETL

Laboratory QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action (CA)	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per batch	TA ≤ QL	Reanalyze batch	Laboratory Manager	Accuracy /Bias-Contamination	TA ≤ QL
Reagent Blank	NA	NA	NA	NA	NA	NA
Storage Blank	NA	NA	NA	NA	NA	NA
Instrument Blank	NA	NA	NA	NA	NA	NA
Laboratory Duplicate	1 per batch	RPD < 20%	Qualify Data	Laboratory Manager	Precision	RPD < 20%
Laboratory Matrix Spike	1 per batch	80-120%	Qualify Data	Laboratory Manager	Accuracy	80-120%
Matrix Duplicate Spikes	NA	NA	NA	NA	NA	NA
LCS	1 per batch	90-110%	Reprep /Reanalyze	Laboratory Manager	Accuracy	90-110%
LFB	NA	NA	NA	NA	NA	NA
Surrogates	NA	NA	NA	NA	NA	NA
Internal Standards (ISs)	NA	NA	NA	NA	NA	NA

Table 18: Fixed Laboratory Analytical QC – Nitrate-Nitrite Nitrogen

LAB SOP	EPA 353.2 Nitrate as N by FIA, #1322 | EPA 353.2 Nitrate as N by SEAL AQ400, #13312 | EPA 353.2 Nitrite as N by FIA, #1326 | EPA 353.2 Nitrite as N by SEAL AQ400, #13210
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Nitrate-Nitrite Nitrogen
Concentration Level	MRL 0.05 mg/L (Nitrate), 0.02 mg/L (Nitrite)
Analytical SOP	See Table 14
Laboratory	State Health Laboratory

Laboratory QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action (CA)	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	NA					
Reagent Blank	5%	<0.025mg/L (nitrate), <0.01mg/L (nitrite)	Re-Run	Laboratory Manager	Accuracy/ Contamination	<0.025mg/L (nitrate), <0.01mg/L (nitrite)
Storage Blank	NA					
Instrument Blank	NA					
Laboratory Duplicate	10%	<20% RPD	Re-Run	Laboratory Manager	Precision	<20% RPD
Laboratory Matrix Spike	10%	90% - 110% Recovery	Re-Run	Laboratory Manager	Accuracy/ Contamination	90% - 110% Recovery
Matrix Duplicate Spikes	NA					
QCS	5%	90-110%	Re-Run	Laboratory Manager	Accuracy	90-110%
LFB	5%	90-110%	Re-Run	Laboratory Manager	Accuracy/Cont amination	90-110%
Surrogates	NA					
Internal Standards (ISs)	NA					

Table 19: Fixed Laboratory Analytical QC – Total Phosphorus

LAB SOP	EPA 365.3 Phosphorus by Flow Injection Analysis Colorimetry, #1328
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Total Phosphorus
Concentration Level	MRL 0.01mg/L
Analytical SOP	See Table 14
Laboratory	RI State Health Laboratories

Laboratory QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action (CA)	Person (s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	NA					
Reagent Blank	5%	<0.010 mg/L	Re-Run	Laboratory Manager	Accuracy/ contamination	<0.010 mg/L
Storage Blank	NA					
Instrument Blank	NA					
Laboratory Duplicate	10%	<20% RPD	Re-Run	Laboratory Manager	Precision	<20% RPD
Laboratory Matrix Spike	10%	80-120% Recovery	Re-Run	Laboratory Manager	Accuracy/ contamination	80-120% Recovery
Matrix Duplicate Spikes	NA					
QCS	5%	90-110%	Re-Run	Laboratory Manager	Accuracy/Contamination	90-110%
LFB	5%	90-110%	Re-Run	Laboratory Manager	Accuracy/ contamination	90-110 %
Surrogates	NA					
Internal Standards (ISs)	NA					

Table 20: Fixed Laboratory Analytical QC – Ortho-Phosphate

LAB SOP	EPA 365.3 Phosphorus by Flow Injection Analysis Colorimetry, #1328
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Orthophosphate
Concentration Level	MRL 0.01mg/L
Analytical SOP	See Table 14
Laboratory	RI State Health Laboratories

Laboratory QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action (CA)	Person (s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	NA					
Reagent Blank	5%	< 0.010 mg/L	Re-Run	Laboratory Manager	Accuracy /Contamination	< 0.010 mg/L
Storage Blank	NA					
Instrument Blank	NA					
Laboratory Duplicate	5%	<20% RPD	Re-Run	Laboratory Manager	Precision	<20% RPD
Laboratory Matrix Spike	10%	80-120% Recovery	Re-Run	Laboratory Manager	Accuracy /Contamination	80-120% Recovery
Matrix Duplicate Spikes	NA					80-120% Recovery
QCS	5%	90-110%	Re-Run	Laboratory Manager	Accuracy /Contamination	90-110%
LFB	5%	90-110%	Re-Run	Laboratory Manager	Accuracy /Contamination	90-110%
Surrogates	NA					
Internal Standards (ISs)	NA					

9.7 Documentation, Records, and Data Management

The Project Manager shall maintain a field notebook, including field log sheets. The monitoring plan as detailed within this report shall be adhered to while sampling. The Project Manager shall review and consult with other Project staff following each sampling event in order to identify any possible errors or omissions.

The Project Manager and appropriate staff shall collect all samples and complete the chain of custody forms for each sampling event. The samples and chain of custody forms shall also be rechecked upon delivery of the samples to the laboratory. A copy of the chain of custody form will be given to the Project Manager when the samples are dropped off at the laboratory. This copy will be retained in the project file. After analysis is complete, sample results from the laboratory will be mailed to Jeff Flashinski at RIDEM.

After each sampling report, a brief Status Report will be written to document any changes to the final Monitoring Plan. All information collected throughout the project will be summarized in the Final Data Report. Table 21 lists records that will be generated throughout this project.

After each sampling event, and upon completion of all analysis by the participating laboratories, all data will be sent to the Project Manager (Jeff Flashinski at RIDEM) in both electronic and paper format. The Project Manager is responsible for the storage of all project files. RIDEM has a records retention schedule at its Providence Office where all original documents will be kept as required by the records retention schedule.

Table 21: Project Documentation and Records

Sample Collection Records	Field Analysis Records	Fixed Laboratory Records	Data Assessment Records
Field Notes / Log Sheets	Field Notes / Log Sheets	Chain of Custody Records	Status Reports
Chain of Custody Records		Tabulated Data Summary Forms: Draft and Final	Final Data Report
Monitoring Plan			

9.8 Assessments and Response Actions

The Project Manager shall be responsible for each of the project tasks and their associated quality assurance and quality control procedures. The Project Manager will ensure consistency between sampling events and will evaluate the status of the project, sampling, quality assurance and quality control and will highlight any problems that are encountered during sampling.

9.9 Quality Control Requirements

Quality control requirements for analytical parameters are specified in Tables 22-27.

Table 22: Field Sampling QC - Chlorophyll-a

SAMPLING SOP	WR-W-32
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Chlorophyll-a
Concentration Level	µg/L
Analytical Method/ SOP Reference	See Table 14

QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person Responsible for Corrective Action
Field Duplicates	Minimum 1 per 10 samples	FSOP6	Discuss any problems with Project Quality Control Officer	Project Manager
Cooler Temperature Blank	1 Per Cooler	4^0 C or less	Add Ice / Re- sample	Project Manager

Table 23: Field Sampling QC - Nitrate-Nitrite Nitrogen

SAMPLING SOP	WR-W-32 WR-W-46
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Nitrate-Nitrite
Concentration Level	mg/l
Analytical Method/ SOP Reference	See Table 14

QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person Responsible for Corrective Action
Field Duplicates	Minimum 1 per 10 samples	FSOP5/FSOP6	Discuss any problems with Project Quality Control Officer	Project Manager
Cooler Temperature Blank	1 Per Cooler	4^0 C or less	Add Ice / Re- sample	Project Manager

Table 24: Field Sampling QC - Ammonia Nitrogen

SAMPLING SOP	WR-W-32 WR-W-46
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Ammonia Nitrogen
Concentration Level	mg/l
Analytical Method/ SOP Reference	See Table 14

QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person Responsible for Corrective Action
Field Duplicates	Minimum 1 per 10 samples	FSOP5/FSOP6	Discuss any problems with Project Quality Control Officer	Project Manager
Cooler Temperature Blank	1 Per Cooler	4^0 C or less	Add Ice / Re- sample	Project Manager

Table 25: Field Sampling QC - Total Kjeldahl Nitrogen

SAMPLING SOP	WR-W-32 WR-W-46
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Total Kjeldahal Nitrogen
Concentration Level	mg/l
Analytical Method/ SOP Reference	See Table 14

QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person Responsible for Corrective Action
Field Duplicates	Minimum 1 per 10 samples	FSOP5/FSOP6	Discuss any problems with Project Quality Control Officer	Project Manager
Cooler Temperature Blank	1 Per Cooler	4^0 C or less	Add Ice / Re- sample	Project Manager

Table 26: Field Sampling QC - Total Phosphorus

SAMPLING SOP	WR-W-32 WR-W-46
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Total Phosphorus
Concentration Level	mg/l
Analytical Method/ SOP Reference	See Table 14

QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person Responsible for Corrective Action
Field Duplicates	Minimum 1 per 10 samples	FSOP5/FSOP6	Discuss any problems with Project Quality Control Officer	Project Manager
Cooler Temperature Blank	1 Per Cooler	4^0 C or less	Add Ice / Re- sample	Project Manager

Table 27: Field Sampling QC - Ortho-Phosphorus

SAMPLING SOP	WR-W-32 WR-W-46
MEDIUM / MATRIX	Surface Water
Analytical Parameter	Ortho-Phosphorus
Concentration Level	mg/l
Analytical Method/ SOP Reference	See Table 14

QC	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person Responsible for Corrective Action
Field Duplicates	Minimum 1 per 10 samples	FSOP5/FSOP6	Discuss any problems with Project Quality Control Officer	Project Manager
Cooler Temperature Blank	1 Per Cooler	4^0 C or less	Add Ice / Re- sample	Project Manager

9.10 QA Management Reports

Table 28 lists the QA Management Reports that will be generated throughout this study. Upon completion of each survey, a brief status report via memorandum will be written in order to document any issues related to sampling and if needed, any changes made to the monitoring plan. As needed during the project, the Project Manager will meet with other staff to discuss any issues related to sampling. These meetings will be verbal status reports. Problems encountered in the field will be discussed and any appropriate actions determined and implemented. Any changes and/or problems will be included in the final report.

After all monitoring is complete the Project Manager will generate a Status Report. This Status Report will be the written record of any changes to the sampling plan. Issues discussed during the Verbal Status Report can also be included. Upon completion of the sampling the Project Manager will write a final report summarizing the sampling events. Information in this final report will include the following information:

- Brief description of each sampling event
- Data tables of all data collected during each sampling event
- Attachments
- Status Reports
- Sampling Logs
- Chain of Custody Forms
- Laboratory data sheets provided by the labs

Table 28: QA Management Reports

Type of Report	Frequency	Person(s) Responsible for Report Preparation	Report Recipient
Verbal Status Report	As needed	Jeff Flashinski RIDEM	Jane Sawyers RIDEM
Written Status Report (memorandum)	As needed	Jeff Flashinski RIDEM	Jane Sawyers RIDEM
Final Report	Completion of Sampling	Jeff Flashinski RIDEM	Jane Sawyers RIDEM

9.11 Verification and Validation Requirements

The Project Manager will review data collected during this study to determine if the data meets the sampling plans objectives. Decisions to qualify or reject data will be made by the Project Manager. All data collected will be included in the Final Report. To ensure correct interpretation of the data, all problems encountered in the field will be included in the Appendix of the report and discussed in the general text of the report. Problems will also be documented in each survey's written Status Report or included in the Field Notebook. To assist in data interpretation, statistical information on sampling events, including sampling size, sample mean, and sample variance will be reported where applicable. A discussion on duplicate precision and accuracy criteria and results will also be discussed in the Final Report.

9.12 Verification and Validation Procedures

All data collected during sampling events will be included in the appendix of the Final Data Report. Once the data has been collected, it will be entered into Microsoft Excel or similar spreadsheet reporting software. The Project Manager will proofread the data entry for errors and will correct any discrepancies. Outliers and inconsistencies will be flagged for further review with other project staff. All data will be reviewed against the criteria. The decision to discard data will be made by the Project Manager and other project staff. Problems will be discussed in the Final Report. Table 29 discusses the data verification process.

Table 29: Data Verification Process

Verification Task	Description	Internal / External	Responsible for Verification
Field Notes	Field notes will be collected at the end of each sampling event. Any required corrective actions will be addressed and implemented prior to the next sampling session. Field notes will be transcribed into the final project report and copies will be maintained with the project file.	I	Jeff Flashinski RIDEM
Chain of Custody Forms	Chain of Custody forms will be reviewed when samples are collected for delivery to the laboratory in the field and at the laboratory. The forms will be maintained in the project file.	I/E	Jeff Flashinski RIDEM URIWW, State Health Laboratory, NETL
Laboratory Data	All laboratory data packages will be verified internally by the laboratory performing the work for completeness prior to submittal. The data packages will also be reviewed by the Project Manager.	I/E	Jeff Flashinski RIDEM URIWW, State Health Laboratory, NETL.

9.13 Data Usability / Reconciliation with Project Quality Objectives

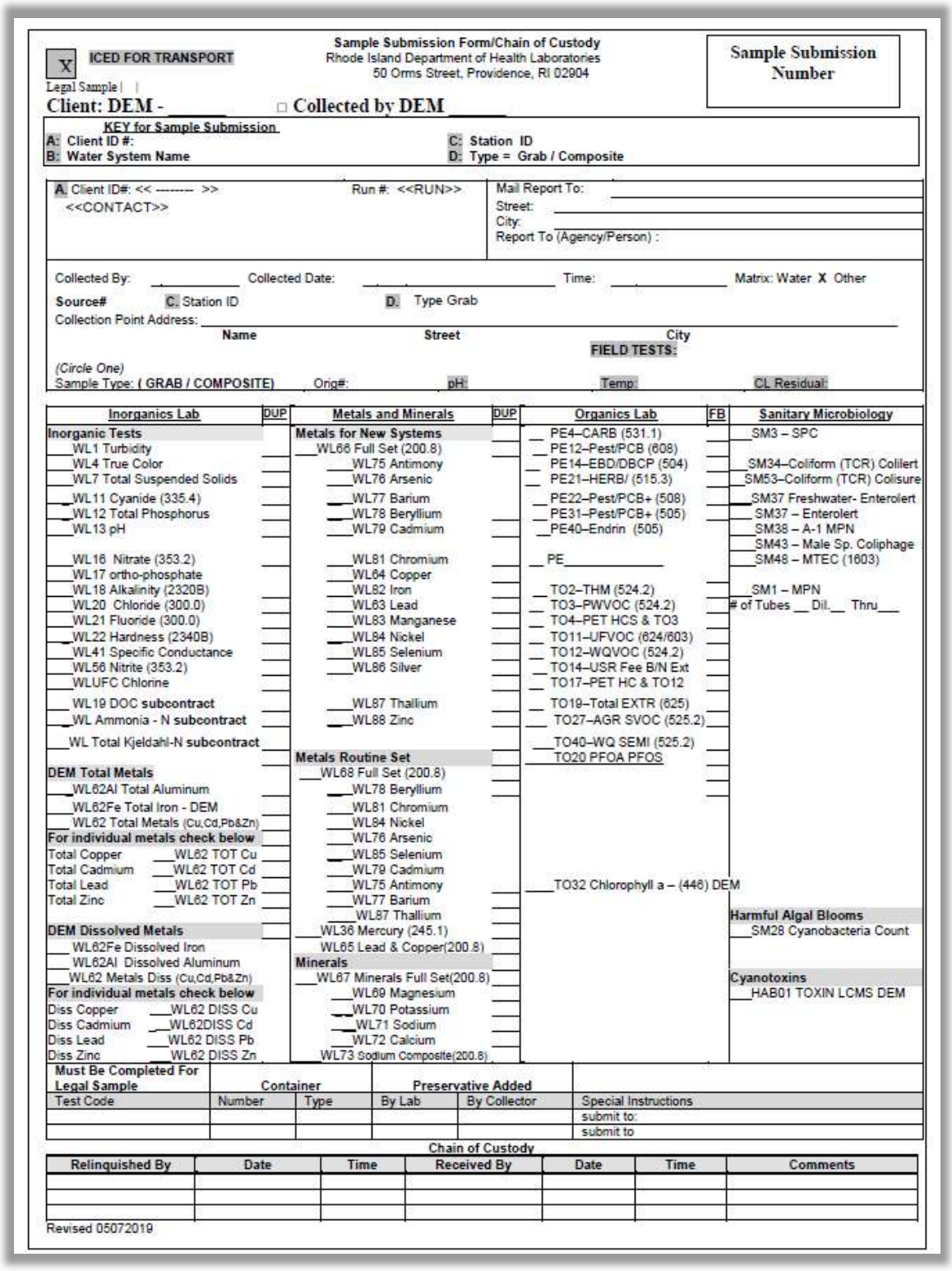
As soon as possible after each sampling event, calculations and determination for precision, completeness, and accuracy will be made and corrective action implemented if needed. If data quality indicators meet those measurement performance criteria documented throughout this sampling plan, the project will be considered a success. If there are data that do not meet the measurement performance criteria established in this QA Plan, the data may be discarded and sampled again or the data may be used with stipulations written about its accuracy in the Final Report. The cause of the error will be evaluated. If the cause is sampling error, additional training will be provided. Any limitations with the data will be documented in the Status Reports and the Final Report. All water quality data will be entered into Rhode Island DEM's State Water Information Management System (SWIMS) database. In addition, all data will be entered and saved onto the Project Managers computer for appropriate storage.

10.0 COVID 19 Safety Guidelines

Field staff will adhere to all EPA issued and State required social distancing guidelines while conducting field work to avoid any unnecessary exposure to the COVID-19 virus. At a minimum this will include the following:

- When possible, maintain a minimum of 6-foot physical distancing when sampling.
- Face masks should be worn when the sampling team cannot maintain 6 feet of distance.
- To the extent possible, field personnel shall set up separate work zones to help maintain social distancing. Job tasks should not change throughout the day unless absolutely necessary.
- Personnel will travel in separate vehicles (GOVs or POVs) when feasible. GOVs will be disinfected following LSASD protocols using provided supplies.
- Each team member will have their own gloves, masks, and hand sanitizer. If possible, field equipment will be designated and touched only by one individual and not shared or passed back and forth.
- RIDEM Team members will use the RIDOA self-screening tool prior to initiating fieldwork. If fieldwork RIDEM Team members are entering The Foundry offices, they will obtain their screening sticker for the day. If fieldwork RIDEM Team members are traveling directly to the field site, no sticker is required.

Appendix A. Chain of Custody Forms



Sample Submission Form/Chain of Custody
Rhode Island Department of Health Laboratories
50 Orms Street, Providence, RI 02904

X ICED FOR TRANSPORT
Legal Sample | |

Sample Submission Number

Client: DEM - _____ □ Collected by DEM _____

KEY for Sample Submission
A: Client ID #:
B: Water System Name
C: Station ID
D: Type = Grab / Composite

A Client ID#: << -------- >>
<<CONTACT>>
Run #: <<RUN>>

Mail Report To:
Street:
City:
Report To (Agency/Person) :

Collected By: _____ Collected Date: _____ Time: _____ Matrix: Water X Other
Source# C Station ID D Type Grab
Collection Point Address: _____
Name Street City
FIELD TESTS:
(Circle One)
Sample Type: (GRAB / COMPOSITE) Orig#: pH: Temp: CL Residual:

Inorganics Lab	DUP	Metals and Minerals	DUP	Organics Lab	FB	Sanitary Microbiology
Inorganic Tests		**Metals for New Systems**		__ PE4–CARB (531.1)		___SM3 – SPC
___WL1 Turbidity		___WL66 Full Set (200.8)		__ PE12–Pest/PCB (608)		
___WL4 True Color		____WL75 Antimony		__ PE14–EBD/DBCP (504)		___SM34–Coliform (TCR) Colilert
___WL7 Total Suspended Solids		____WL76 Arsenic		__ PE21–HERB/ (515.3)		___SM53–Coliform (TCR) Colisure
___WL11 Cyanide (335.4)		____WL77 Barium		__ PE22–Pest/PCB+ (508)		___SM37 Freshwater- Enterolert
___WL12 Total Phosphorus		____WL78 Beryllium		__ PE31–Pest/PCB+ (505)		___SM37 – Enterolert
___WL13 pH		____WL79 Cadmium		__ PE40–Endrin (505)		___SM38 – A-1 MPN
						___SM43 – Male Sp. Coliphage
___WL16 Nitrate (353.2)		____WL81 Chromium		__ PE_____		___SM48 – MTEC (1603)
___WL17 ortho-phosphate		____WL64 Copper				
___WL18 Alkalinity (2320B)		____WL82 Iron		__ TO2–THM (524.2)		___SM1 – MPN
___WL20 Chloride (300.0)		____WL63 Lead		__ TO3–PWVOC (524.2)		# of Tubes __ Dil.__ Thru___
___WL21 Fluoride (300.0)		____WL83 Manganese		__ TO4–PET HCS & TO3		
___WL22 Hardness (2340B)		____WL84 Nickel		__ TO11–UFVOC (624/603)		
___WL41 Specific Conductance		____WL85 Selenium		__ TO12–WQVOC (524.2)		
___WL56 Nitrite (353.2)		____WL86 Silver		__ TO14–USR Fee B/N Ext		
___WLUFC Chlorine				__ TO17–PET HC & TO12		
___WL19 DOC **subcontract**		____WL87 Thallium		__ TO19–Total EXTR (625)		
___WL Ammonia - N **subcontract**		____WL88 Zinc		___ TO27–AGR SVOC (525.2)		
___WL Total Kjeldahl-N **subcontract**				___TO40–WQ SEMI (525.2)		
		Metals Routine Set		___TO20 PFOA PFOS		
DEM Total Metals		___WL68 Full Set (200.8)				
___WL62Al Total Aluminum		____WL78 Beryllium				
___WL62Fe Total Iron - DEM		____WL81 Chromium				
___WL62 Total Metals (Cu,Cd,Pb&Zn)		____WL84 Nickel				
For individual metals check below		____WL76 Arsenic				
Total Copper ___WL62 TOT Cu		____WL85 Selenium				
Total Cadmium ___WL62 TOT Cd		____WL79 Cadmium				
Total Lead ___WL62 TOT Pb		____WL75 Antimony		____TO32 Chlorophyll a – (446) DEM		
Total Zinc ___WL62 TOT Zn		____WL77 Barium				
		____WL87 Thallium				**Harmful Algal Blooms**
DEM Dissolved Metals		___WL36 Mercury (245.1)				___SM28 Cyanobacteria Count
___WL62Fe Dissolved Iron		WL65 Lead & Copper(200.8)				
___WL62Al Dissolved Aluminum		**Minerals**				
___WL62 Metals Diss (Cu,Cd,Pb&Zn)		___WL67 Minerals Full Set(200.8)				**Cyanotoxins**
For individual metals check below		____WL69 Magnesium				___HAB01 TOXIN LCMS DEM
Diss Copper ___WL62 DISS Cu		____WL70 Potassium				
Diss Cadmium ___WL62DISS Cd		____WL71 Sodium				
Diss Lead ___WL62 DISS Pb		____WL72 Calcium				
Diss Zinc ___WL62 DISS Zn		___WL73 Sodium Composite(200.8)				

Must Be Completed For Legal Sample	Container		Preservative Added		
Test Code	Number	Type	By Lab	By Collector	Special Instructions
					submit to:
					submit to

Chain of Custody

Relinquished By	Date	Time	Received By	Date	Time	Comments

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Figure A-1: Chain of Custody Form State Health Laboratory

Chain of Custody - Chlorophyll URI Watershed Watch

DEM SITE ID	DATE / TIME COLLECTED	CHL	TIME FILTERED	CHL VOLUME FILTERED	NO. OF CHL FILTERS

DEM SIGNATURE	DATE / TIME	WATERSHED WATCH SIGNATURE	DATE / TIME

Figure A-2: Chain of Custody Form URI Watershed Watch

Appendix B. Field Sampling Standard Operating Procedures (FSOP)

FSOP1 and FSOP1a Sounding Depth- Depthmate Model SM-5
WR-W-7 Secchi Disc Depth
WR-W-34 YSI ProPlus
WR-W-32 RIDEM Surface Water Sample Collection
WR-W-46 RIDEM Van Dorn Sample Collection
FSOP6 Integrated Sampling Device

Appendix C. Laboratory Standard Operating Procedures (LSOP)

LSOP 012: Chlorophyll-a
LSOP2/2a: Nitrite-Nitrate Nitrogen
LSOP3: Ammonia Nitrogen
LSOP4: Total Kjeldahl Nitrogen
LSOP5 and LSOP6: Total Phosphorus and Orthophosphorus