Model Quality Assurance Project Plan (QAPP) for EPA Sanitary Survey App for Marine and Fresh Waters

Prepared by:
Office of Water

October 2022
Revision 0
EPA 820-R-22-002

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This document was prepared to support participatory scientists with the development of quality assurance project plans (QAPPs) for their collection of environmental data and information using the EPA Sanitary Survey App for Marine and Fresh Waters. The document provides a template that participatory science groups could fill in with their own information in areas noted. Additionally, participatory science groups could tailor this QAPP template based on the data and information to be collected and as such, they may not need to fill out all the sections in the template. This model QAPP could also be used as a guide to develop a QAPP for collecting environmental data and information using paper versions of the sanitary surveys.

Acknowledgements

This document was prepared by CDR Samantha Fontenelle and Bryan Ibrahim Goodwin in the Office of Water (OW), Office of Science and Technology (OST), Standards and Health Protection Division (SHPD). All inquiries about this document should be directed to EPA_SanitarySurveyApp@epa.gov.

Acknowledgment also goes to the following individuals for their contributions in the preparation and/or review of this document and for the knowledge and expertise including possible approaches for developing the EPA's Sanitary Survey App QAPP — Shari Barash, Bill Kramer and Menchu Martinez (OW/OST/SHPD); Heather Drumm (Office of Research and Development); Erick Burres (California State Water Resources Control Board); Tonya Bonitatibus and Dr. Dale Reddick (Savannah Riverkeeper); and Dr. Trey Sherard (Anacostia Riverkeeper).

[Include a document title page with the following information.]

Quality Assurance Project Plan (QAPP) for [Insert project title]

Prepared for:

[Specify organization name]

[Specify organization address]

Prepared by:

[Insert names of QAPP preparers]

[Include document date]

Revision #

[Note: A distribution list should be included with the original QAPP and any updates made to the QAPP. The Quality Assurance Officer should be organizationally independent of the Project Manager.]

Project Name:	Quality Assurance Project Plan (QAPP) for *[specify project name]*
Effective Date of Plan:	[Insert date]
Name(s) who prepared the plan:	[Insert name(s) of QAPP preparer]
Printed Name and Title:	[Insert name of Program Manager], Project Manager
Signature and Date:	_____
Printed Name and Title:	[Insert name of reviewer of QAPP], QAPP Reviewer
Signature and Date:	_____
Printed Name and Title: Assurance Officer	[Insert name of Quality Assurance Officer], Quality
Signature and Date:	_____
Printed Name and Title: Assurance Manager	[Insert name of Quality Assurance Manager], Quality
Signature and Date:	_____

QAPP Revision History

[Note to QAPP writer: Include this section to document if the QAPP has been revised. The following is an example of how to document the revisions to the QAPP.]

This Quality Assurance Project Plan (QAPP) has been revised as necessary to reflect changes in project organization, tasks, schedules, objectives, sampling design and methods, etc.

On *[insert date 1]*, the following changes were made to the QAPP:

- [e.g., Added new sampling sites to Figure 1 and Table 1.]
- [e.g., Changed key staff *[specify]* in the Section 15, Organization Chart.]

On *[insert date 2]*, the following changes were made to the QAPP:

- [e.g., Updated project schedule in Section 4.]

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1.0 Project Management

1.1 Problem Definition

Across the United States, recreational waters (which include coastal and inland recreational waters) are polluted by a number of sources. Sewage treatment plant malfunctions, sewage overflows, boating wastes and leaking septic systems are some of the many sources that contribute to fecal contamination of water quality. Runoff containing sewage, animal waste, fertilizer, pesticides, trash and other pollutants from construction sites, farms, and urban sources (lawns and streets) during and after a heavy rain also often contribute to water quality impairment. These sources of contamination can lead to poor water quality, beach advisories or beach closures.

Waters containing human and non-human fecal waste create high risk environments for the spread of waterborne diseases to those swimming and interacting with the water. Many waterborne pathogens cause illnesses in humans and can pose a public safety risk.

1.2 Background

States, territories, and tribes conduct water monitoring in recreational waters to determine if levels of fecal indicator bacteria (FIB) (e.g., enterococci or *E. coli*) exceed applicable water quality standards or Beach Action Values (BAVs). When monitoring results show exceedances of a water quality standard or BAV for pathogens or pathogen indicators, states, territories, and tribes often issue a beach advisory that either warns people of possible health risks of swimming or close the recreational waters to public swimming and similar water contact activities. Routine monitoring of recreational waters can also identify waters impaired by other sources. However, limited agency resources often lead to gaps in data collection. Water quality impairment can lead to waters being listed on the CWA Section 303(d) list triggering the requirement to develop Total Maximum Daily Loads (TMDLs) which are plans to reduce the pollutant loadings and restore such waters.

The *[specify organization name]* has been working collaboratively with *[if applicable, identify collaborators – e.g.,* volunteers and state and local agencies*]* to identify sources of pollution impacting recreational waters in *[specify city/county, state]* to improve water quality and protect public health. Since *[specify date monitoring program began]*, we have trained more than *[specify number]* volunteers to conduct water quality monitoring in *[specify city/county, state]*. Our volunteer monitoring program has identified numerous water quality problems allowing state programs to prioritize and address pollution sources impacting these waterbodies. *[Note: If this is the first time conducting water quality monitoring, please revise this text accordingly.]*

1.3 Project Description

[Note to QAPP writer: The project description below may be modified to describe the intended purpose of the study – e.g., the project description could mention that data and information would be collected in waterbodies not routinely monitored by a jurisdiction.]

The purpose of this project is to conduct regular monitoring and sanitary surveys to determine if *[specify waterbodies or beaches being monitored]* are meeting state water quality standards and/or Beach Action Values (BAV). Our staff and volunteers will collect *[specify frequency, e.g.,* weekly or biweekly*]* samples of recreational waters shown in Table 1. Staff and volunteers will also collect environmental, weather-related, water quality, people, and pollution source information to help identify possible sources of pollution impacting water quality. Sanitary survey data will be collected using the freshwater or marine routine and annual surveys in the EPA Sanitary Survey App for Marine and Fresh Waters. While these surveys are designed to collect many different information or data types, there are only a few required fields (*i.e.,* waterbody type, beach/waterbody name, survey date and time, surveyor name and affiliation and QAPP requirement) in the app.

The minimum data fields in the app that volunteers for *[specify organization name]* will collect are included in the Field Sampling and Analysis Plan (SAP) *[Note to QAPP writer: In addition to the required fields in the app, states/tribes have the discretion to identify additional data fields that also need to be collected. Field SAP should be developed by the watershed organization or sponsoring agency before field work begins]*. Generally, the data to be collected using the app include the following *[Note to QAPP writer: Specify below the sections and data fields in the app that volunteers should collect. The first five items listed below are required fields in the app, followed by examples of additional sections and data fields in the app that could be included in the Field SAP.]*:

- Waterbody type
- Beach/waterbody name
- Survey date and time
- Surveyor name and affiliation
- Submittal of QAPP requirement
- [*identify additional fields in app and included in the Field SAP - e.g., Weather & General Waterbody Conditions section (air temperature, wind speed, direction, rainfall, wave, tides and currents)]*
- *[identify additional fields in app and included in the Field SAP - e.g., Water Quality section (e.g., water temperature, water color, pH, turbidity)]*
- *[identify additional fields in app and included in the Field SAP - e.g., Bather Load: # of Beach Users section and beach activities observed]*
- *[identify additional fields in app and included in the Field SAP - e.g., Potential Pollution Sources section (e.g., discharge sources, floatable and debris, algae, Harmful Algal Blooms (HABs), wildlife and domestic animals observed)]*

Volunteers will be trained on the proper collection and transport of samples by the *[identify appropriate staff lead]* prior to initiating water quality monitoring. Staff and volunteers will collect water samples from *[identify specific nearby recreational waters]* and deliver them to the *[specify who will receive the water samples – e.g., watershed organization Monitoring Coordinator]*. The *[specify appropriate staff lead – e.g., Monitoring Coordinator]* will deliver or ship water samples to an approved lab *[specify name of approved laboratory]* for analysis of the

presence of *E. coli* (freshwater samples) or enterococcus (fresh and marine waters samples) using EPA approved *[specify methods]* (refer to Section 10). *[Note: Some organizations may choose to train their volunteers to perform sample processing/analysis using EPA approved methods].* The *[specify appropriate staff lead – e.g., Project Manager/Lead]* shall include the laboratory QA documentation in the project records. *[Note: All samples processed by the organization must include the appropriate QA/QC documentation.]*

Table 1. Water Quality Monitoring Locations

[*Note to QAPP writer*: *Include the following information for all the sites being monitored.*]

Beach or Station ID	Waterbody/Beach Name	Monitoring Location	GPS Coordinates (degrees, minutes, seconds)
[e.g., Site01]	*[e.g., Best Beach]*	*[e.g., Near Sandy Road]*	*[e.g., Lat: 00° 00' 00" N Long: 00° 00' 00" W]*
[e.g., Site02]	*[e.g., Fair Beach]*	*[e.g., Near Dusty Road]*	*[e.g., Lat: 00° 00' 00" N Long: 00° 00' 00" W]*
Include additional sampling locations	--	--	--

2.0 Data Quality Objectives and Data Quality Indicators

2.1 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements that clarify the intended use of the data, define the type of data needed to support the decision, identify the conditions under which data should be collected, and specify tolerable limits on the probability of making a decision error because of uncertainty in the data (if applicable). Data of known and documented quality are essential to the success of any project that involves data collection. Data users develop DQOs to specify the data quality needed to support specific decisions.

The primary objective of this project is to collect water quality data and surrounding watershed information of the appropriate type *[specify, e.g., grab vs. composite samples, bacteria samples vs. other water quality parameters (Section 8.0)]*, quality *[specify per Table 2, Sections 7.5 & 11.0],* and quantity *[specify frequency – e.g.,* weekly or biweekly*]* to help identify potential sources of pollution, potential HAB events, and surrounding watershed information that may impact recreational waters. The information to be collected is intended to be used *[specify the intended use, e.g., share with state or local beach programs, Department of Health, Department of the Environment or Natural Resources to identify recreational waters not meeting water quality standards or Beach Action Values; identify remediation actions needed; develop models to predict daily recreational water quality; or facilitate watershed planning.]*

2.2 Data Quality Indicators

To determine whether the data quality objectives are being met, we have evaluated the following Data Quality Indicators (DQI) for each parameter measured. Table 2 includes additional information for the quantitative indicators (i.e., precision, accuracy and measure range) in the routine surveys. *[Note to QAPP writer: A number of these indicators in Table 2 (e.g., rainfall, water temperature, algae, HABs) are also included in the annual surveys. The indicators in the annual surveys not listed in Table 2 (e.g., erosion/accretion measurements, beach dimensions, distance of beach facilities, tides, tidal pool size, longshore and nearshore currents, etc.) should be specified in the QAPP or SAP indicating how these measurements would be taken and verified if they are collected. Refer to the Marine and Freshwater Sanitary Survey User Guides for additional information on how these parameters should be measured.]* The qualitative indicators (*i.e.,* representativeness, comparability, and completeness) are discussed below.

Precision is the ability of a measurement to consistently be reproduced. Repeated measurements are usually used to determine precision. In the case of repeated measurements, one would see how close those measurements agree. Precision is often measured as the relative percent difference (RPD) or the relative standard deviation. Table 2 shows a list of precision objectives. Precision is often evaluated by taking duplicate measurements for at least 10% of samples, where applicable (Schoen and Warren, 2006).

Accuracy is a degree of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. Also, the more precise or reproducible the result, the more reliable or accurate the result. Accuracy can be determined by comparing an analysis of a chemical standard to its actual value. Table 2 shows a list of accuracy objectives. The accuracy of water quality monitoring is usually assessed based on laboratory QC data or on the identification of biological samples by a taxonomic expert (Schoen and Warren, 2006).

Representativeness is how well the collected data depict the true system. Most sampling locations or monitoring sites will be selected to be representative of the waterbody. The timing and frequency of sample collection will be based on gathering data that are representative of target conditions (*e.g.,* a range of water levels, weather, seasons, etc.) (Schoen and Warren, 2006).

Comparability is the extent to which data from one data set can be compared directly to another data set. The data sets will have enough common ground, equivalence or similarity to permit a meaningful analysis. The comparability of the data collected can be assured by applying consistent procedures and approach to data collection.

Completeness is the amount of data that must be collected to achieve the goals and objectives stated for the project. It is determined by comparing the amount of valid, or usable, data collected to what was originally planned to collect. A goal of monitoring activities will be to maximize completeness. At least 80% of the anticipated number of samples are typically collected, analyzed, and determined to meet data quality objectives for the project to be considered fully successful (Schoen and Warren, 2006).

Measurement range is the range of reliable readings of an instrument or measuring device, or a laboratory method, as specified by the manufacturer or the laboratory. The *[specify the appropriate staff lead – e.g., Project Manager/Lead and/or Monitoring Coordinator]* will ensure that proper calibration procedures are followed for each analytical method to ensure the accuracy of the measurement data. Analytical instruments and equipment will be maintained and calibrated according to SOPs based on the manufacturers' specifications and the requirements of specific analytical procedures. Proper maintenance and calibration will ensure optimum operating conditions throughout a measurement program. Each laboratory will have a program for verifying the accuracy and traceability of calibration standards against the highest quality standards available.

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Table 2. Data Quality Indicator

[Note to QAPP writer: Include the following information for all the parameters for which data is being collected. The entries below are example parameters with associated accuracy, precision and measurement range information.]

Survey/App Section	Section	Parameter	Units	Accuracy[a]	Overall Precision (RPD)[b]	Approximate Measurement Range
Freshwater and Marine Routine and Annual Surveys	Part 1 (Routine); Part 4 (Annual)	Rainfall	inches (rain gauge)	+/- 0.1 inch (in general)[a]	<20% between two different gauges for the same event	0-3 inches per event
Freshwater and Marine Routine and Annual Surveys	Part 2 (Routine); Part 4 (Annual)	Water temperature	Celsius degrees (ºC)	+/- 1ºC	<10% (between field duplicate samples or readings)	0-35 ºC
Freshwater and Marine Routine Surveys	Part 2	Turbidity	NTU	90-110% recovery of turbidity std	+ 0.5 NTU if less than 1 NTU or 20% RPD if more than 1 NTU	0-200
Freshwater and Marine Routine Survey	Part 2	Secchi disk depth	*[specify units, e.g., meters]*	+/- 0.1 meter (in general)	< 20% (between two different readers for same "sample")	0-5 meters
Freshwater and Marine Routine Survey	Part 2	pH	pH	+/- 0.3	<20% (between field duplicate samples or readings)	4-10
Marine Routine Survey	Part 2	Salinity	ppt	+/- 1 ppt	< 20% (between field duplicate samples or readings)	0-32 ppt
Freshwater and Marine Routine Survey	Part 2	Conductivity	Siemens(S)/cm	+ 5% of known QC std.	<20% (between field duplicate samples or readings)	10-1000 fresh 800-50,000+ salt water
Freshwater and Marine Routine Survey	Part 2	Dissolved oxygen	*[specify units, e.g., mg/l]*	+/- 0.5	<20% (between field duplicate samples or readings)	0-12
Freshwater and Marine Routine and Annual Surveys	Part 4 (Routine); Part 9 (Annual)	Algae presence/ absence, amount, type and color	Present or absent, amount (in %) & identify type and color	100% accuracy of visual, photographic or other identification *[specify method of identification] e.g., subject matter expert (SME)]*	N/A	N/A

Freshwater and Marine Routine and Annual Surveys	Part 4 (Routine); Part 9 (Annual)	Harmful Algal Bloom (HAB) presence/ absence	Present or absent	100% accuracy based on field guide, online taxonomic guide, photographic or other identification *[specify method of identification, e.g., by appropriate staff lead or subject matter expert (SME)]. [Note: This is not a measure of possible toxins in the water, just visible presence of HABs at the time of monitoring.]*	N/A	N/A
Freshwater and Marine Routine and Annual Surveys	Part 4 (Routine); Part 9 (Annual)	Presence of Dead Birds	Presence or absent & identify species	100% accuracy of visual, photographic or other identification *[specify method of identification e.g., by appropriate staff lead or SME]*	N/A	N/A
Freshwater and Marine Routine and Annual Surveys	Part 3	Land Use	Percent cover (%)	100% accuracy based on *[specify method of identification – e.g., current land use map]*	N/A	N/A

[a] Usually accuracy objectives are estimates assuming a true value were known and could be tested; all analytical accuracy objectives (i.e., for samples) include non-detectable concentrations in ambient field blanks.
[b] For analytical samples, the objective for overall precision is typically based on the relative percent difference (RPD) of co-located, simultaneous field duplicates.
Source: Schoen and Warren, 2006.

3.0 Project Schedule

[Note to QAPP writer: Provide a Project Schedule that includes important project milestones/ activities and work schedules. A list of the minimum milestones/activities are provided below. If the project is dependent on external funding sources (grants, contracts), you may want include milestones related to funding activities such as "apply for grant funding", etc.]

Table 3. Project Schedule

Milestones/Activities	Group/Person responsible for activity completion	Timeframe work will be done
Define project scope (*this may be done in consultation with state or local water quality monitoring programs*)		
Identify sampling locations		
Identify and select laboratory		
Prepare Quality Assurance documents, field SOPs and field Sampling and Analysis Plan (SAP)		
Recruit volunteers (*if necessary*)		
Conduct kickoff meeting with volunteers		
Train new and/or returning volunteers		
Conduct water quality monitoring (weekly or biweekly) (collect water samples and conduct routine sanitary surveys)		
Review data for quality and completeness		
Analyze data and take necessary action and/or share data with state recreational water quality program and/or public health department		
[Specify additional milestones]		

4.0 Training and Specialized Experience

All volunteers will attend annual training prior to participating in any monitoring activities (such as collecting water samples and sanitary survey data). The *[specify who provides training – e.g., Monitoring Project Manager/Lead or Field Training Lead]* will provide training prior to the start

of each sampling season, and as needed when new volunteers are added. Volunteers will receive both classroom and field training on sampling requirements including proper use and maintenance of all sampling equipment, sample collection, sample processing and handling, and field documentation. Experienced volunteers will complete, at a minimum, annual field-based training under the supervision of a *[specify who provides training – e.g., Project Manager/ Lead or Field Training Lead]*. Experienced volunteers may be allowed, at the discretion of the trainer, to review classroom presentation materials virtually (e.g., online/electronically) in lieu of classroom training. Successful completion of annual training for each volunteer is measured as either 100% classroom attendance or review of classroom materials, along with field demonstration of the ability to conduct field activities (e.g., sample collection and processing, chain of custody documentation, etc.).

All volunteers will either complete training on the EPA Sanitary Survey App for Marine and Fresh Waters, or view the online training video available at https://www.epa.gov/beach-tech/sanitary-surveys-recreational-waters, prior to using it in the field. Volunteers will also read the QAPP, field SOPs, field SAP and other project documentation and acknowledge that they have done so by signing the appropriate project documentation.

Field team members will follow applicable safety guidance from the *[specify watershed or sponsoring organization name]*. Team members may also refer to the applicable sections of the U.S. Geological Survey (USGS) *A Guide to Safe Field Operations* to ensure personal safety during sampling events. The *[specify organization name]* *[specify appropriate staff lead – e.g., Quality Assurance (QA) Officer and/or Project Manager/Lead]* are responsible for ensuring these general training/certification requirements are satisfied and properly documented. Training requirements can be documented in Table 4.

Table 4.Volunteer/Staff Training Record

[Note to QAPP Writer: Identify volunteer/staff training, type of training and frequency in this table.]

Personnel/Group to be Trained	Description of Training (Including Trainer(s))	Frequency of Training
[e.g., Volunteer or ambient water quality monitors]	*[Field sampling and QAPP]*	*[Annually]*
[e.g., Volunteer laboratory personnel]	*[Sample Processing/Analysis]*	*[Annually]*

5.0 Document and Records

Volunteers will document data for each sampling event, e.g., beach/waterbody, environmental, weather, water quality, people and pollution source information in the Freshwater Routine Sanitary Survey and/or Marine Routine Sanitary Survey. Data will be collected using EPA Sanitary Survey app. See https://www.epa.gov/beach-tech/sanitary-surveys-recreational-waters for more information on the EPA Sanitary Survey app.

The surveys in the app will be downloaded to one's mobile device prior to going into the field to collect data. The data from these electronic surveys are submitted to the EPA GeoPlatform. Volunteers will download their data and submit the data file to the *[specify who receives the downloaded data and include his/her location and email address – e.g., Project Manager/Lead]*.

Project-related information will be kept electronically in project files organized by year and managed by the *[specify the appropriate staff lead – e.g., Project Manager/Lead or designee]*. *[Note to QAPP writer: If paper sanitary surveys are used for data collection, the QAPP could indicate that the completed paper surveys will be scanned and electronic copies saved in the project folder]*. Laboratory analytical results and supporting documentation will also be saved electronically to the project folder. Miscellaneous records documenting instrument checks, calibrations, and maintenance will be kept in a logbook. Photographs not taken with the app and all paper copies of project-related forms, logs and notes (e.g., field logs, notes, chain of custody forms, training acknowledgement forms, etc.) will be scanned and/or saved to the project files. Project files will be maintained for a minimum of *[specify retention time e.g., minimum of 3 years, or as directed by the sponsoring agency]*. Electronic project files will be backed up and protected from loss and damage. A copy or copies will be kept at an additional site (may include cloud-based storage). Table 5 provides a list of documents/records and their retention time.

Table 5. Table of Records and Retention Times

Document/Record	Retention Time*	Form
QAPP	*[specify]*	Electronic
Field SAP	*[specify]*	Electronic
SOPs	*[specify]*	Electronic
Chain of Custody forms	*[specify]*	Electronic
Field data sheet/Laboratory results	*[specify]*	Electronic
[Include additional pertinent records]		

6.0 Existing Data and Data from Other Sources

The app includes links to several websites including the National Weather Service, EPA's BEACON and Water Quality eXchange (WQX) databases where weather data, beach IDs, and sampling site IDs, respectively, can be obtained. Data do not automatically populate into the app from these websites, they must be manually entered. *[Note to QAPP writer: The website resources can also be used for completing the paper surveys.]* Additional informational resources are provided in Section 18 *[Note: If data/information from websites are used, cite the source and date site was accessed. QA/QC for data obtained from these sites is not required, see Table 2.]*

7.0 Sample Design and Data Collection Methods

[Note to QAPP writer: Section 7 is optional and only applies if water samples are being collected when conducting sanitary surveys.]

7.1 Sample Design

Routine sampling activities include collecting water quality samples at sampling sites shown on the map (Figure 1) and listed in Table 1. Samples will be collected *[specify time(s) and day(s) samples will be collected]*. A sampling site with *E. coli* or enterococci results that exceeds the water quality standard or BAV will be resampled on the next sampling day after receipt of results, if possible. Each sample or batch of samples delivered or shipped to a laboratory will be accompanied by sample chain of custody forms.

7.2 Methods

[Specify organization name] volunteers will use standardized methods that adhere to specific, state-defined procedures for sampling and trained personnel to ensure that samples are collected consistently both between sampling locations and teams. Volunteers will collect water samples at a consistent depth, *[specify depth sample should be collected – e.g., either ankle or knee depth],* depending on the conditions at the recreational waterbody and the safety of the person(s) collecting the sample. Volunteers will only use pre-sterilized sampling bottles *[specify sampling bottles size and type − e.g., polypropylene, polysulfone (Nalgene)]* with appropriate preservative if required, as provided for sample collection.

Before going into the field, volunteers will ensure that they have the necessary sampling equipment, sufficient coolers and ice to properly store samples before shipping or transporting samples to the lab, and they have downloaded the sanitary surveys onto mobile devices. A Field Sampling Standard Operating Procedures (SOPs) will be developed by *[specify organization name – e.g., Watershed Organization or sponsoring* agency*]* to ensure consistency in field sample collection and processing. See section 8.0 for additional information on sample handling and chain of custody.

7.3 Location

[Note to QAPP writer: Include a map of the sampling locations/sites in Table 1. See below for an example map. Map sources include USGS mapping tool *and EPA's* How's My Waterway.*]*

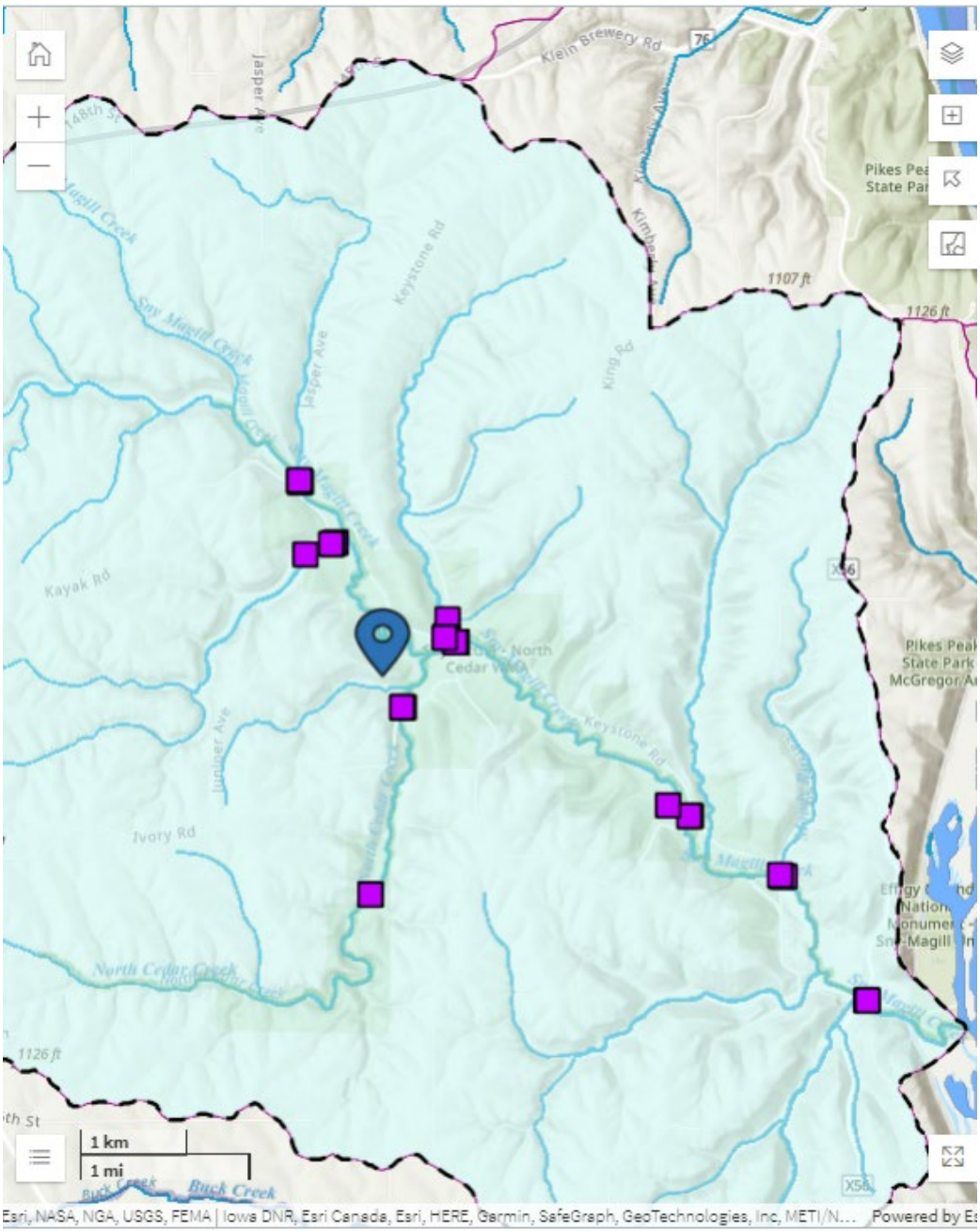

Figure 1. Location of Sampling Sites.

7.4 Schedule

Sample schedule and frequency will depend on funding. Samples will be collected and delivered or shipped to the lab on a *[specify frequency of sample collection – e.g., weekly, biweekly schedule]* from *[identify sampling period – e.g., May through September]*.

7.5 Quality Control

[Note to QAPP writer: Quality Control (QC) consists of steps the organization should take to determine the validity of specific sampling and analytical procedures. Quality assessment is the organization's assessment of the overall precision and accuracy of the data, after conducting the analyses.]

Quality control samples (e.g., field replicates, lab blanks, etc.) to be collected will be specified in the Field Sampling SOP. It is standard practice to take field quality control samples for 10% of all water quality samples collected. See section 11.0 for more information on field and lab QC samples.

Internal checks will be performed by the project field volunteers, staff, and lab. *[Note to QAPP writer: Below is a sample list of Quality Control and Assessment Measures – Internal Checks (USEPA, 1997). Include any internal check appropriate for the project]:*

- ***Field Blanks:*** *A trip blank (also known as a field blank) is deionized water which is treated as a sample. It is used to identify errors or contamination in sample collection and analysis.*
- ***Negative and Positive Plates (for bacteria):*** *A negative plate results when the buffered rinse water (i.e., water used to rinse down the sides of the filter funnel during filtration) has been filtered the same way as a sample. This is different from a field blank in that it contains reagents used in the rinse water. There should be no bacteria growth on the filter after incubation. It is used to detect laboratory bacteria contamination of the sample. Positive plates result when water known to contain bacteria (such as wastewater treatment plant influent) is filtered the same way as a sample. There should be plenty of bacteria growth on the filter after incubation. It is used to detect procedural errors or the presence of contaminants in the laboratory analysis that might inhibit bacteria growth.*
- ***Field Duplicates:*** *A field duplicate is a duplicate sample collected by the same team or by another sampler or team at the same place, at the same time. It is used to estimate sampling and laboratory analysis precision.*
- ***Lab Replicates:*** *A lab replicate is a sample that is split into subsamples at the lab. Each subsample is then analyzed and the results compared. They are used to test the precision of the laboratory measurements. For bacteria, they are used to obtain an optimal number of bacteria colonies on filters for counting purposes.*
- ***Spike Samples:*** *A known concentration of the indicator being measured is added to the sample. This should increase the concentration in the sample by a predictable amount. It is used to test the accuracy of the method.*
- ***Calibration Blank:*** *A calibration blank is deionized water processed like any of the samples and used to "zero" the instrument. It is the first sample analyzed and used to set*

the meter to zero. This is different from the field blank in that it is sampled in the lab. It is used to check the measuring instrument periodically for "drift" (the instrument should always read "0" when this blank is measured). It can also be compared to the field blank to pinpoint where contamination might have occurred.

- ***Calibration Standards.*** *Calibration standards are used to calibrate a meter. They consist of one or more "standard concentrations" (made up in the lab to specified concentrations) of the indicator being measured, one of which is the calibration blank. Calibration standards can be used to calibrate the meter before running the test, or they can be used to convert the units read on the meter to the reporting units (for example, absorbance to milligrams per liter).*

In general, field survey and laboratory data will be reviewed for quality control. The *[specify the appropriate staff lead – e.g., Project Manager/Lead and/or QA Officer]* will conduct reviews and make determinations for accepting, rejecting, or qualifying it. The *[specify the appropriate staff lead – e.g., Project Manager/Lead and/or QA Officer]* will be responsible for addressing corrective actions with the laboratory. Laboratory QA documents will be included in the project files (refer to Section 5.0).

The *[specify the appropriate staff lead – e.g., Project Manager/Lead and/or QA Officer]* will verify the accuracy of data transferred or entered from electronic sources into the app by independently checking 10 percent of the surveys. All identified data transfer errors will be corrected, and correction verified.

8.0 Sample Handling and Custody

[Note to QAPP writer: Section 8 is optional and only applies if water samples are being collected when conducting sanitary surveys.]

8.1 Sample Handling

Sample handling procedures will be applied when water quality samples are collected for laboratory analysis because proper sample collection, preservation, and storage are critical to the accuracy of results of water quality analyses for fecal indicator bacteria (FIB), and satisfying QA/QC requirements of state certification programs. To prevent sample contamination, project sampling staff and volunteers collecting samples will avoid touching the insides of bottles or lids/caps during sampling or wear disposable gloves.

Samples will be properly labeled in the field with the following:

- waterbody name
- sample location (note: Sanitary Survey app automatically geolocates sampling locations).
- sample number
- date and time of collection

- sample type (grab or composite)
- sampler's name
- method used to preserve sample

All volunteers collecting water quality samples will receive training by the *[specify who will conduct training – e.g., Project Manager/Lead or Field Training Lead]* on proper techniques for sample collection, transportation and delivery. Any dropped or contaminated samples will be promptly recollected and redelivered (whenever possible). Any disposable supplies including sample bags, pipette tips, quanti-trays, quanti-bottles in contact with samples, will be disposed of immediately after use. Caution will be taken to prevent sample contamination and damage to sampling equipment.

Specific steps will be taken to avoid sample mislabeling and ensure label integrity. Sufficient coolers and ice will be available to place samples promptly on ice for shipment or transport to the laboratory.

All samples will be handled and transported in accordance with Field Sampling SOPs for each indicator. Field Sampling SOPs will be developed by the *[specify watershed organization name or sponsoring agency]* to ensure consistency in field sample collection and processing.

8.2 Sample Types

Volunteers will collect *[specify if "grab" or composite]* samples at the locations specified in Figure 1. *[Note to QAPP writer: If the watershed organization chooses to collect composite samples, it will specify the number of samples in each composite in the Field Sampling SOP]*. The *[specify appropriate staff lead – e.g., Project Manager/Lead]* will coordinate with the analytical laboratory to ensure that proposed sample collection procedures, in the Field Sampling SOP, and all holding times meet the needs of the chosen laboratory.

8.3 Sampling Methods and Custody

All sampling equipment and sample containers must be cleaned according to the equipment specifications and/or the analytical laboratory prior to sampling. Bottles supplied by a laboratory are pre-cleaned and must never be rinsed, and will be filled only once with sample.

Field sampling SOPs will include guidance on sample collection methods including sampling locations, depth and time of day samples will be collected. In general, volunteers will sample in the most convenient and safest points of access. For example, stream samples may be collected from pedestrian-friendly bridges with a line attached to a PVC bridge sampler or by accessing the stream from the streambank. *[Note to QAPP writer: Insert a table of sample collection methods as Table 6;and sampling considerations as Table 7, see examples provided.]*.

Sample labels will be affixed to all sample containers and include the information specified in Section 8.1. Chain of custody (COC) forms *[Note to QAPP writer: see example COC in Table 8.]* will be completed by monitoring staff and/or volunteers and included with all samples sent to the lab for analysis. COC forms will also be signed by all individuals who gain custody of the samples until they arrive at a lab. Monitoring staff and/or volunteers will ensure that the

information on the COC forms agrees with the label information on the sample bottles. All samples will be tracked, and their location known at all times.

Table 6. General Sample Collection Methods

[Note to QAPP writer: This table only applies if water samples are being collected when conducting the sanitary survey. The information below is provided as examples.]

Waterbody Type	Sample Type	Parameter(s)	Container Type(s) and Preparation	Minimum Sample Quantity[2]	Sample Preservation	Maximum Holding Time
Rivers Lakes	In-situ (pH strips, thermometer, single and/or multiprobes	- DO - pH - conductivity - temperature - other	--	--	--	--
	Manual grab sample	TSS	Glass or Plastic	300 ml	Refrigerate/chill to <6ºC	- 7 days
		Turbidity	Plastic	100 ml	Refrigerate/chill to <6ºC	48 hours
		pH	HDPE	300 ml	Refrigerate/chill to <6˚C	Transport to lab within 8 hours of collection
		E. coli	- Sterilized HDPE/PP/glass - Whirlpak bag	120 ml per analyte	- Sodium thiosulfate if chlorine residual suspected - Refrigerate/ chill to <6ºC	- Transport to lab within 6 hours - Analyze within 8 hours of collection
	Secchi disk	Secchi depth transparency	Not applicable	Not applicable	Not applicable	Not applicable
	Turbidity	Turbidimeters/nephelometers	Not applicable	Not applicable	Not applicable	Not applicable
	Rain gauge	Rainfall amount	Not Applicable	Not Applicable	In-situ	Not Applicable
	Winkler bottle or reagent kit	Dissolved Oxygen (DO) (manual)	"BOD" bottle	300 ml	- Fix immediately - Refrigerate/chill to <6˚C - Dark storage	
	DO meters	DO	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Velocity meter or Flow meter	Water velocity and streamflow	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Refractometer	Salinity	Not Applicable	Not Applicable	Not Applicable	Not Applicable

	Hydrometer					
	Conductivity meters	Conductivity	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Beaches – lakes – rivers – coastal	In-situ (single and/or multiprobes)	- DO - pH - conductivity - temperature - other	***See above for Rivers/Lakes***			
	Manual grab sample	- TSS	***See above for Rivers/Lakes***			
		- Turbidity	***See above for Rivers/Lakes***			
		- pH	***See above for Rivers/Lakes***			
		- *E. coli* - Enterococci	***See above for Rivers/Lakes***			
	Secchi disk	Secchi depth transparency	***See above for Rivers/Lakes***			
	Rain gauge	- Rainfall amount	***See above for Rivers/Lakes***			
	Winkler bottle or reagent kit	- Dissolved Oxygen (manual)	***See above for Rivers/Lakes***			
	Velocimeter or Flow meter	- Water velocity and streamflow	***See above for Rivers/Lakes***			

Note: HDPE – high density polyethylene; PP – polypropylene.
Source: Schoen and Warren, 2006.

Table 7. Field Sampling Considerations for Common Parameters

[Note to QAPP writer: This example table only applies if water samples are being collected when conducting the sanitary survey. The information below is provided as examples.]

Waterbody Type	Sample Type	Parameter	Sampling Considerations
Rivers **Lakes**	In-situ (single and/or multiprobes)	- DO - pH - conductivity - temperature - other	- Sample at consistent time each day; however, DO best sampled in the very early morning (to capture "worst case" conditions after darkness) - Inspection, maintenance, pre-calibration and post-checking of probes are critical to achieving accurate and precise measurements, especially for DO.
	Manual grab sample	TSS	Avoid disturbing bottom sediments. Leave one inch of air in container to allow shaking before analysis.
		Turbidity	
		pH	Avoid stirring up bottom sediments. Collect sample under water surface. Fill to overflowing. Cap while under water to avoid air in sample.
		E. coli	- Sterile (new-sealed or autoclaved-sealed) bottle required. - Place upright, capped sample bottle under the surface of the water about six inches. Do not rinse bottle. Slowly uncap and let it fill to capacity under the water. With hands away from the bottle opening, bring the bottle up and out of the water, pour sufficient water to leave approximately 1/2 inch air space in the bottle. Cap bottle and tighten. - Latex gloves should be worn when sampling in waters suspected of contamination.
	Winkler bottle or reagent kit	Dissolved Oxygen (manual)	Sample collected at surface with care to avoid entraining bubbles into the bottle. If bubbles get in, empty and begin again. Sample is fixed immediately on site. Store in dark. Best sampled before sunrise to capture "worst case".
	Rain gauge	Rainfall amount	Develop and follow an SOP.
	Refractometer Hydrometer	Salinity	Calibrate instrument to zero using distilled water before using
	Velocity meter or Flow meter	Water velocity and streamflow	Due to the complexities involved in accurately estimating streamflow, streamflow measurements using velocimeters should only be performed by experts. Staff gauge readings (that are incorporated into a site-specific stage-discharge curve developed by experts) are more appropriate for volunteer groups. Streamflow measurement for educational purposes is appropriate.
Beaches - lakes - rivers - coastal	Manual grab sample	*E. coli* Enterococci	Same as *E.coli* above.

Source: Adapted from Schoen and Warren, 2006.

Table 8. Chain of Custody Form

[Note to QAPP writer: This example table only applies if water samples are being collected when conducting the sanitary survey. The information below is provided as examples.]

Sampler's Signature:____*[Insert]* _____

Organization:____ *[Insert]* _____

Name of Lab:____ *[Insert]* _____

Site ID/ Waterbody Name	Sample IDs	Date & Time of Collection	Type of Sample Collected	#Bottles	Analyses	Comments

Relinquished by (print name and provide signature):	Received by (print name and provide signature):	Sample condition when received (i.e., warm, cool, frozen):	Date/Time:

Additional Comments:	

8.4 Sampling Safety

When conducting field sampling, personal safety will be a primary responsibility for all field staff and volunteers. No sampling will occur when personal safety is at risk. The *[specify the appropriate staff lead – e.g., Project Manager/ Lead and Monitoring Coordinator]* will decide whether adverse weather or other conditions pose a threat to safety of monitoring volunteers and will cancel or postpone sampling when necessary. For safety reasons, sampling will take place in teams of *[specify team size, e.g., two or more]*. Samplers will wear life vests when sampling from boats or wading in waters under difficult conditions. Samplers will wear proper clothing to protect against the elements, especially footwear and raingear. When sampling in rivers, samplers will estimate flow and avoid sampling when conditions are unsafe, i.e., when river depth (in feet) x velocity (feet per second) is 5 or greater (Note: 1.5 foot depth * 4 feet/second velocity = 6 = unsafe conditions) (Schoen and Warren, 2006).

When sampling where HABs are suspected, use appropriate safety equipment, for example gloves, eye protection (such as goggles), and waders/boots during sampling. Do not ingest water or allow the water to come into contact with exposed skin. Avoid inhaling spray caused by boats, wind or other water surface disturbances. If these conditions are present, wear a mask to avoid inhalation of water spray. Hands should be washed thoroughly after sampling before eating or drinking. Waders/boots should be rinsed before storage. Sampling crews should also watch for and report any symptoms of exposure to cyanotoxins, which can occur immediately to several days following exposure. Personal protective equipment should be rinsed between uses to help avoid any potential cross-contamination of waterbodies if multiple waterbodies are sampled using the same equipment. More information cyanotoxin monitoring can be found in Recommendations for Cyanobacteria and Cyanotoxin Monitoring in Recreational Waters.

9.0 Equipment List, Instrument Maintenance, Testing, Inspection and Calibration

[Note to QAPP writer: Section 9 is optional and only applies if water samples are being collected when conducting sanitary surveys.]

Prior to a sampling event, all sampling instruments and equipment will be tested and inspected in accordance with the manufacturers' specifications. All equipment standards (thermometers, pH meters, etc.) will be calibrated appropriately and within stated certification periods prior to use. Regular inspection and calibration of field instruments will be conducted prior to the field season *[Note to QAPP writer: see example Table 9]*. Monitoring staff will document and ascertain that required acceptance testing, inspection, and maintenance have been performed. Records of this documentation will be kept with the instrument/equipment kit in bound logbooks or data sheets (see Section 5.0). Contracted and subcontracted laboratories will follow the testing, inspection and maintenance procedures as stated in the Field SAP.

Records to be maintained include equipment and reagents/calibration solutions inventory, calibration records, and maintenance records.

Table 9. Example of Typical Instrument Calibration Procedures

[Note to QAPP writer: This example table only applies if water samples are being collected when conducting sanitary surveys.]

Instrument	Inspection and Calibration Frequency	Standard of Calibration of Equipment Used	Corrective Action
Calibrated line (for secchi disk, line bailer)	Annually	Tape Measure	Recalibrate or replace with calibrated line
Multi-probe meter	Before each sampling run	Standard solutions, according to manufacturer's recommendations	According to manufacturer's instruction.
pH meter	Before each sampling run	pH buffers 4.01 and 7 or external standards	Adjust instrument, clean electrodes, replace electrodes
Thermometer	Annually	NIST certified thermometer	Replace or provide correction factor
DO/other water quality meter	Before each sampling run	Follow manufacturer's instruction. DO meter: compare against Winkler titration	Replace membrane or correct instrument
Electronic balance (solids)	Before each sampling run	Use of certified inspection standards	Adjust and recalibrate
Conductivity meter	Before each sampling run	Known Standards	Adjust according to manufacturer's recommendations
Turbidity meter	Before each sampling run	External standards	Adjust instrument
Flow meter	Before each sampling run	N/A	According to manufacturer's instruction. Also see Office of Surface Water Tech Memo 99.06
Refractometer	Before each sampling run	Fresh water, 0 Salinity	Recalibrate, replace, repair as needed

* External standards refer to standards of reliable quality obtained from reputable commercial or another supplier. Known standards refer to those where the value is knownbefore calibration.
Source: Schoen and Warren, 2006.

The following is a list of some basic water quality field sampling supplies and equipment for any volunteer field activity (USEPA 1997, 2021). Some of this equipment is optional but will enhance the volunteers' safety and effectiveness. Table 10 includes a sample list of acceptance procedures for supplies and equipment.

- Sample bottles or containers
- Sampling labels
- Chain of custody forms
- Cooler with ice
- Boots or waders; life jackets if you are sampling by boat

- Personal identification (e.g., driver's license)
- Latex gloves
- Goggles/ Eye Protection (e.g., sunglasses)
- Hat
- Walking stick of known length for balance, probing, and measuring
- Bright-colored snag- and thorn- resistant clothes; long sleeves and pants are best
- Hand sanitizer
- Distilled water
- Paper towels
- Disinfectant surface cleaner
- First aid kit, flashlight, and extra batteries
- Whistle to summon help in emergencies
- Refreshments and drinking water
- Clipboard, preferably with plastic cover
- Pencils
- Tape measure
- Thermometer
- pH meter
- Conductivity meter
- Secchi disc
- GPS (note: Sanitary Survey app automatically geolocates sampling locations).
- Information sheet with safety instructions, site location information, and numbers to call in emergencies
- Camera and charger, to document particular conditions (Note: The Sanitary Survey app has photo taking capability and photo storage)
- Cellular phone, tablet or computer with downloaded sanitary survey app
- Paper copies of sanitary surveys (as backup)

Table 10. Example of Typical Supplies Inspection, Acceptance Procedures

[Note to QAPP writer: This table only applies if water samples are being collected when conducting sanitary surveys.]

Supplies	Inspection Frequency	Type of Inspection	Available Parts	Maintenance
Reagents, titration cartridges, alcohol	Before each sampling date	Visual inspection of quantity and expiration date	Spare, fresh reagents/cartridges	Store according to manufacturer's recommendations; replace annually prior to start of sampling season
Calibration standards	Before each sampling date	Visual inspection of quantity and expiration date	Spare, fresh solutions	
Membranes, filters, bags (e.g., Whirlpak, ziplock)	Before each sampling date	Visual inspection of quantity, integrity	Spares	Store according to manufacturer recommendations
Field and lab sample sheets	Before each sampling date	Visual	Additional copies	--
Waders or life preservers	Before each sampling date	Visual inspection for damage	Patch kit	As needed
Sample bottles	Before each sampling date	Verified sterility of bacterial sample bottles, equipment or reinstate blank for reused bottles	One set of spare bottles	Clean after use
Cooler	Before each sampling date	Cleanliness, ice packs	----	Replace annually or as needed

Source: Schoen and Warren, 2006.

10.0 Analytical Methods

[Note to QAPP writer: Section 10 is optional and only applies if water samples are being collected when conducting sanitary surveys.]

The methods used by personnel in the *[specify lab name]* to analyze water samples for fecal indicator bacteria density will be approved for monitoring of FIB in ambient water. EPA approved methods for *E.coli* (for freshwater samples) or enterococcus (for fresh and marine waters samples) *[specify methods]* in ambient water are available at https://www.epa.gov/cwa-methods/approved-cwa-microbiological-test-methods. *[Specify organization name]* will follow the state/tribal sponsoring agency methods.

11.0 Field and Analytical Laboratory Quality Control Summary

[Note to QAPP writer: Section 11 is optional and applies only if water samples are being collected when conducting sanitary surveys.]

Water quality sampling will include field and lab quality control samples to assess general data quality issues. It is standard practice to take field quality control samples for 10% of all water quality samples collected. Example numbers of QC samples required to meet an approximately 10% rate are as follows (Schoen and Warren, 2006):

- 1-10 samples taken; 1 QC sample is processed.
- 11-20 samples taken; 1-2 QC samples are processed.
- 21-30 samples taken; 2-3 QC samples are processed.

Specific procedures for field and lab QC samples will be defined in the Field SAP or appropriate SOPs. Lab QC protocols will be discussed with the lab prior to sampling to ensure acceptability.

12.0 Data Management

The *[specify the appropriate staff lead – e.g., Project Manager/Lead]* will be responsible for ensuring that all requirements for data management are met. All field data generated during this study will be recorded, stored, and managed in accordance the organization's SOPs for data management. One advantage to using the Sanitary Survey app is that all the data collected are stored and can be managed on the EPA GeoPlatform. This data will be available to the staff and volunteers of *[specify organization name]* who have completed surveys. Volunteers and staff should export their data from the EPA GeoPlatform and either submit it to the *[specify the appropriate staff lead – e.g., Project Manager/Lead]* or upload to a project review folder for QA/QC review.

A copy of sanitary survey data from the app or paper surveys generated at each site will be maintained in the appropriate project folder organized by year (see Section 5.0). This data will

be available to the staff of *[specify organization name]*. *[Specify organization name]* will engage with the state, tribal and local public health and environmental agencies and other community partners to share data and identify areas of concerns.

13.0 Reporting, Oversight and Assessments

13.1 Assessments and Response Actions

Assessments may be conducted during the field investigation according to Category 2 projects, to ensure the QAPP is being implemented as approved. Category 2 projects are defined in the SESD Operating Procedure for Project Planning (USEPA 2007) as environmental studies of moderate complexity that covers a limited area during a limited timeframe.

The *[specify the appropriate staff lead – e.g., Project Manager/Lead]* is responsible for all corrective actions while in the field. Any issues that may arise during sampling will be documented in the logbooks. This documentation and any corrective actions taken will be used to determine the overall quality and usability of the data. *[Specify the appropriate staff lead – e.g., Project Manager/Lead]* will review the data to determine whether it is acceptable. The field sampling team will be notified of sampling issues and the corrective action taken. Documentation of sampling issues and corrective actions will be included in the project management files (See Section 5.0).

13.2 Reports to Management

Data collected using the Sanitary Survey app and QC laboratory sample will be provided to the *[insert sponsoring organization or Agency]*. The *[specify the appropriate staff lead, e.g., Project Manager/Lead]* will also prepare a final report and provide quarterly preliminary results to the sponsoring agency or to the management of *[specify organization name]*. The *[specify the appropriate staff lead – e.g., Project Manager/Lead]* will be responsible for notifying stakeholders if any circumstances arise during the field study that may adversely impact the quality of the data collected. Any problems noted during field sampling that could result in unusable data will be addressed in the final report. Data that does not meet all method requirements will not be reported but may be useful for problem identification and SOP modifications.

14.0 Data Review and Usability

14.1 Validation Methods

[Note to QAPP writer: Data validation determines whether the data sets meet the requirements of the project-specific intended use as described in the QAPP. That is, were the data results of the right type, quality, and quantity to support their intended use? Data validation also attempts

to give reasons for sampling and analysis anomalies, and the effect that these anomalies have on the overall value of the data.]

Any actions taken to correct QA/QC problems in sampling, sample handling, and analysis will be noted. Under the direction of the *[specify the appropriate staff lead – e.g., Project Manager/Lead and/or Project QA Manager]*, project staff will document any QA/QC problems and QA/QC corrective actions taken. The *[specify the appropriate staff lead – e.g., Project Manager/Lead or his/her designee]* is responsible for reviewing field log notebooks and field data sheets for accuracy and completeness within 48 hours of each sample collection activity, if possible. Sampling will be repeated if there are issues.

All laboratory data will be validated by the Laboratory QA Officer according to the laboratory's QAPP and SOPs prior to issuing the laboratory report, and will become part of the laboratory's permanent record. The rationale for any anomalies in the QA/QC of the laboratory data will be provided to the *[specify the appropriate staff lead – e.g., Project Manager/Lead]* along with the data results. Completed COC forms (Table 7) will be returned by the laboratory to the *[specify who receives COC forms – e.g., Project Manager/Lead]*. Data will be qualified as necessary.

[Note to QAPP writer: Use of the app will avoid transcription errors from paper forms to electronic files. However, when developing a QAPP for data collection using field log notebooks and/or data field sheets instead of the app, then the QAPP should include that the appropriate staff lead will compare the app survey data with the field logs to ensure that no transcription errors have occurred, and to verify project QC criteria have been met. The QAPP should also indicate that the appropriate staff lead, if necessary, will decide if any QA/QC corrective action will be taken if the precision, accuracy (bias) and data completeness values exceed the project's data quality objectives as defined in Section 2.2. Data that do not meet the data quality objectives will not be used or if used, the problems with the data will be clearly defined, flagged appropriately and data use clearly delimited and justified.]

14.2 Verification Methods

The primary goal of verification is to document that applicable methods, procedures and contract requirements were met in field sampling and laboratory analysis. Verification checks will be conducted to determine if the data are complete and if sampling and analysis were performed in accordance with the QAPP, Field SAP and SOPs. Data verification is the responsibility of the Project QA Officer. The Project QA Officer will verify at least 10% of generated project data.

14.3 Reconciliation With User Requirements

The *[specify the appropriate staff lead – e.g., Project Manager and the Project QA Officer]* will review and validate data against the project's defined data quality objectives prior to final reporting stages. If there are any problems with water quality sampling and analysis, the issues will be addressed immediately, and changes will be made (if necessary) to sampling methods to ensure that data quality objectives are met. The sponsoring organization will be notified and the approved QAPP will be revised accordingly. Only data that has been validated and qualified, as necessary, will be provided to the sponsoring organization.

15.0 Project Organization Chart

[Note to QAPP writer: Include an organization chart with reporting structure for the watershed organization. Figure 2 is a sample chart.]

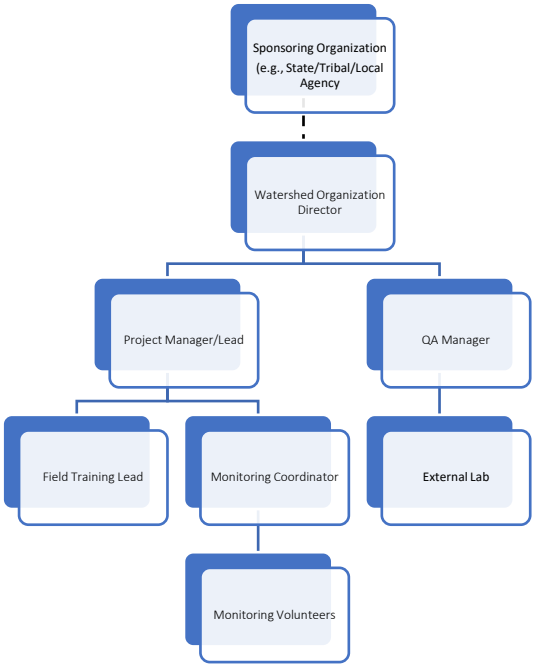

Figure 2. *[Specify Watershed Organization Name]* Monitoring Program Organization Chart

16.0 Project Organization

[Note to QAPP writer: Include a table as shown below with project roles and responsibilities for the watershed organization's monitoring program. Table 11 is an example table. Changes can be made to this table without the need for an immediate revision to the QAPP.]

Table 11. Project Organization for *[Specify Organization Name]* Monitoring Program

Name	Title	Organization	Responsibilities
[Enter Name]	Project Manager/Lead	*[Enter Organization Name]*	The Project Manager/Lead is responsible for managing the water quality monitoring program; obtaining adequate equipment and supplies; training personnel; managing the volunteer sampling process; scheduling, reporting, and taking constructive corrective actions when required.
[Enter Name]	QA Manager	*[Enter Organization Name]*	The QA Manager is an individual with adequate expertise in analytical chemistry and field operations to review procedures and data generated. When necessary, the QA Manager consults outside experts, including appropriate Federal, regional and state agencies (e.g., Department of Environmental Protection) on relevant technical issues. The QA Manager ensures that every provision of the QAPP is conducted to the maximum extent practicable. The QA Manager reports any problems to the monitoring program Project Manager/Lead after sampling events, and works with the Project Manager/Lead to document and correct any deviations, consulting outside experts and advisers as necessary. As appropriate, significant deviations will be reviewed for approval by signatories. The QA Manager must be independent from project execution.
[Enter Name]	Monitoring Coordinator	*[Enter Organization Name]*	For a given sampling event, the Monitoring Coordinator is responsible for organizing and ensuring samples are collected and processed for delivery to labs for analysis. The Monitoring Coordinator receives samples from volunteer samplers and maintains proper preservation of samples prior to transport to the lab. The Monitoring Coordinator supervises volunteer monitors

			filling out chain of custody forms. Volunteers should contact the Monitoring Coordinator when sampling problems or scheduling issues arise. The Monitoring Coordinator is also responsible for replenishing supplies for the monitoring volunteers for the next sampling event. For a given event, the role of Monitoring Coordinator may be executed by the QA Manager, Project Manager/Lead, other trained staff members, or by a suitably trained volunteer.
[Enter Name]	Field Training Lead (if different from Project Lead)	*[Enter Organization Name]*	The Field Training Lead trains and evaluates monitoring volunteers and must be familiar with the monitoring program QAPP and other field documentation. It is recommended that instructors who are not trained staff members conduct at least one year of independent sampling and field analysis before assuming the role of Field Training Lead. At the training, topics discussed will include proper sampling techniques and locations, safety, and handling of samples.
[Enter Name]	Monitoring Volunteers	*[Enter Organization Name]*	Monitoring Volunteers perform all field measurements, complete all records, and coordinate the actual collection of samples during a sampling event. Volunteers are required to read, understand, and perform all procedures in the QAPP. In addition, they are required to participate in the monitoring program Training Program.
[Enter Name]	Sponsoring Organization	*[Enter Organization Name]*	The Sponsoring Organization partners with *[specify organization name]*, and provides guidance, technical and logistical support, training, and quality assurance and field sampling documentation.

17.0 Project Distribution List

[Note to QAPP writer: Include in the table below project participants who should receive a copy of the QAPP and supporting documents (e.g., SOPs). A link to or a copy of the QAPP must be shared with EPA when using the Sanitary Survey app (refer to Part 2 of the surveys for QAPP requirements).]

Table 12. QAPP Distribution List for *[Specify Organization Name]* Monitoring Program

Recipient/Title	Organization Affiliation	Telephone Number	Email Address
Project Manager/Lead			
QA Manager			
Monitoring Coordinator			
Field Training Lead			
Monitoring Volunteers			
Laboratory Contact			
Sponsoring organization (e.g., state Agency) Contact (if applicable)			
Grant Project Officer (if applicable)			
US EPA	US EPA HQ		EPA_SanitarySurveyApp@epa.gov

18.0 Resources

[Note: the following resources are provided for QAPP writer as additional potential sources of information. The QAPP writer may decide to include these resources in QAPP for reference.]

The following are additional resources with information pertinent to water quality monitoring that meet data quality requirements. Participatory scientist and volunteer water quality monitoring organization staff should contact their state, tribal, or EPA regional quality assurance staff for specific information or guidance.

- Volunteer Monitor's Guide to Quality Assurance Project Plans
- Quality Assurance Handbook and Guidance Documents for Citizen Science Projects
- EPA Sanitary Survey Website provides instructions and other resources on the app.
    - Marine Sanitary Survey User Manual
    - Freshwater Sanitary Survey User Manual
    - Instructions for Obtaining Credentials and Accessing Surveys
    - Data Export Tool Instructions
    - Video demos:
        - Freshwater Sanitary Routine Survey
            - Playlist: Water Contact Sanitary Survey Workshop

    - Data Export Tool
- EPA Volunteer Stream Monitoring: A Methods Manual provides information and guidance to program managers who want to launch a new stream monitoring program or enhance an existing program. Volunteer Stream Monitoring presents methods that have been adapted from those used successfully by existing volunteer programs.
- EPA Volunteer Estuary Monitoring A Methods Manual explains how to establish and maintain a volunteer monitoring program, as well as working effectively with volunteers and ensuring their safety.
- Georgia Adopt-A Stream (GAAS) is a statewide volunteer water quality monitoring program in the Georgia Environmental Protection Division funded by an EPA Section 319(h) grant.
    - Bacterial Monitoring Manual provides information on GAAS bacterial monitoring program for *E.coli*.
    - Visual Stream Survey Manual provides information on monitoring rivers and streams.
    - Macroinvertebrate and Chemical Stream Monitoring Manual provides information on measuring physical/chemical parameters.

19.0 References

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USGS (U.S. Geological Survey). 1995. A Guide to Safe Field Operations, U.S. Geological Survey Open-File Report 95-777. https://pubs.usgs.gov/of/1995/of95-777/wq_act.html. Accessed on November 18, 2021.