New Jersey Department of Environmental Protection; Bureau of Freshwater and Biological Monitoring
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REGIONAL TARGETED WATER QUALITY NETWORK

QUALITY ASSURANCE PROJECT PLAN

Raritan Region

February 2022-December 2023 Cycle

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1.0 Project Name: Regional Targeted Water Quality Network

2.0 Project Requested by: Bureau of Environmental Analysis and Restoration and Standards (BEARS)

3.0 Date of Project: April 2022-December 2023.

4.0 Project Fiscal Information: Job Number 35950000, Activity Code V4AR

5.0 Project Officer: Kris Mastropaolo, Project Officer, NJDEP, BFBM
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6.0 Special Training Needs/Certification

All staff participating in this project will be trained in the proper collection techniques as outlined in the "NJDEP Field Sampling Procedures Manual," August 2005; the document available online at the NJDEP's webpage, <http://www.state.nj.us/dep/srp/guidance/fspm/ >. (The NJDEP Field Sampling Procedures Manual is currently being updated and the sections are subject to change in the update. Chapters 1, 2 and 4 have been updated on the website).

Safety training and safety requirements will comply with Bureau of Freshwater and Biological Monitoring Field Work Health and Safety Plan (HASP) Version #2 August 2019.

BFBM is certified by the Office of Quality Assurance (certified lab ID # 11896) for the following parameters for this project: dissolved oxygen, temperature, pH, conductance, and turbidity.

7.0 Project Background

The *Comprehensive Regional Assessment Using A Rotating Basin Approach* encourages the development of measures to restore, maintain and enhance water quality uses tailored to address an issue or a region. Measures developed are designed to maximize effectiveness and efficiency in achieving positive environmental outcomes. This approach is consistent with USEPA guidance related to strategies and priorities for water quality restoration as outlined in EPAs guidance: *A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program.*

This holistic approach is used to evaluate the State's waters as part of the Integrated Water Quality Assessment Report (Integrated Report). The Integrated Report includes the "303(d) List of Water Quality Limited Waters" (303(d) List), which satisfies the Section 303(d) requirement to biennially produce a list of waters that are not meeting surface water quality standards (SWQS) despite the implementation of technology-based effluent limits and thus require the development of Total Maximum Daily Loads

(TMDLs) or watershed restoration plans to restore water quality. The 303(d) List is the only part of the Integrated Report that is subject to regulatory requirements.

The Integrated Report also includes an "Integrated List of Waters" (Integrated List) that combines the reporting requirements of Sections 305(b) and 303(d) of the Act by depicting the use assessment results for every applicable designated use in each assessment unit as "fully supporting", "not supporting", or "insufficient information".

Under the *Comprehensive Regional Assessment Using A Rotating Basin Approach*, the Department focuses on targeted sites located in New Jersey's five water regions (Atlantic Coastal, Lower Delaware, Upper Delaware, Raritan, and Northeast) during each Integrated Report cycle. The targeted water region approach results in a comprehensive assessment of the entire state every 10 years.

The assessment process is a two-step evaluation process: Step 1 uses improved computer technology to apply the assessment protocols in the **Integrated Water Quality Monitoring and Assessment Methods** document **(Methods Document)** to determine preliminary assessment decisions; Step 2 involves an in-depth analysis incorporating water quality data results from step 1 along with other factors such as hydrology, geology, land use, biological habitat conditions, meteorology, restoration activities, point and nonpoint sources, use designation, stream classification, and other relevant environmental considerations to determine overall water quality. During Step 2, a team of analysts conducts a comprehensive assessment that includes confirmation of water quality conditions based on the above factors through the application of Geographic Information Systems (GIS) tools, aerial and satellite-based photography, field observations, and visual assessments. The objective is to produce an in-depth analysis applying across-the-board watershed information to make assessment decisions with a high degree of confidence. This would allow the Department to address multiple water resource concerns based on an assessment of the specific environmental conditions affecting the targeted region.

The Department is improving confidence in its assessment decisions by increasing the number of samples required for certain parameters, referred to as the target sample size. The target sample size has been selected to more accurately capture variable water quality conditions such as natural variability, seasonal changes, varying hydrologic conditions, as well as underlying natural conditions and the effects of anthropogenic activities. The target sample size during this cycle for conventional parameters is 10 samples and for metals and toxic pollutants it is 4 samples. These samples will be collected over at least a 1-year period. The assessment methodology including sample size requirements are discussed in detail in the 2017 Methods Document.

The result of implementing the *Comprehensive Regional Assessment Using A Rotating Basin Approach* is the increase of temporal resolution at the cost of spatial resolution. The Regional Targeted Water Quality Network was developed to meet the data need by creating a monitoring network that is regionally focused, rotates on a 1 to 2 year

cycle, and collects enough samples to meet the target sample size at each sampling station.

For the selection of sampling stations, BEARS technical staff conducted a comprehensive review of selected water regions. The staff used prior monitoring data, Integrated List assessment results, restoration activities, hydrology, land use, potential pollutant sources, and other environmental data to select potential monitoring locations. The multi-step process using water quality data and GIS tools resulted in the selection total of twenty-five water quality sites. The prioritization criteria for selecting the water quality sampling stations included:

1. Assessment Units *(AUs) without any water quality data (highest priority)
2. AUs with some water quality data but not enough to make a decision
3. AUs with marginal decisions either for impaired or non-impaired
4. AUs based on data over 10 yrs. old higher priority
5. AUs needing follow-up sampling or special situation (see prior assessment comments)
6. AUs with restoration projects that potentially could show improvement
7. AUs with a TMDL or planned TMDL
8. AUs with non-support biology but no water quality especially if biology recently degraded
9. Station represents more than one AU
10. AUs with C1 or Outstanding National Resource Waters
11. AUs with public water supply intake or reservoir
12. Number of potential point or non-point pollutant sources
13. Avoid AUs with a lake station on the main stem or represents AU especially with recent data
14. Avoid AUs with a fixed network station
15. Avoid AUs with recent HUC14 Stations
16. Avoid small tributaries
17. Avoid AUs that are small or headwaters (try to use downstream site)

After review and reconnaissance by BFBM staff a total of twenty-five monitoring stations were selected for the Regional Targeted Water Quality Monitoring Network, April 2022-December 2023 Cycle.

*** New Jersey's assessment units are delineated based on 14-digit Hydrologic Unit Code (HUC) boundaries. HUCs are geographic areas representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the USGS in cooperation with the Natural Resources Conservation Service (NRCS).**

8.0 Project Description

For the period between April 2022 and December, 2023, the RTWQN will consist of twenty-five monitoring stations. Sampling of sites will commence April 2022. Network sampling will conclude December 2023.

Regional Targeted Water Quality Stations:

Twenty-five stations will be monitored for the parameters included in attachment A. These stations will be monitored for conventional/nutrient parameters and for metals parameters of the frequency detailed in Section 13.0, Sampling Schedule. Discharge measurements will be made at all stations where applicable during each sampling event.

9.0 Project Objectives

The project objective is to collect water quality samples that meet the needs for the Regional Comprehensive Assessment outlined in the 2017 Methods Document. Section 7.0 "Project Background" summarizes the new assessment approach that includes regionally focused assessments and more frequent data requirements. For the 2022-23 cycle, sampling will take place in the Raritan region to collect data that will be used in the 2026 Integrated Report.

10.0 Monitoring Network Design

Water Quality Stations: Twenty-five stations (list included in Attachment B) will be sampled for conventional/nutrient parameters each month of the sampling year with the exceptions of November and January. A period of at least two weeks between sampling events is required. The stations will also be sampled for metals parameters four months out of the sampling year (February, June, August, October). A list of physical/ chemical parameters is included in Attachment B. Discharge measurements will accompany each sample at every station during each sampling event.

11.0 Sampling Procedures

11.1 General Procedures: Sampling frequencies for conventional parameters (nutrients, suspended solids, chloride, etc.) and field parameters will be monthly except for November and January. Discharge (flow) measurements at each station will be taken during each sampling event by BFBM staff utilizing USGS procedures. A full explanation of BFBM's procedures for discharge measurement can be found in Attachments C (for wadable streams) and D (for non-wadable streams). Metals monitoring will occur four times per year (February, June, August, October) to produce both high flow and low flow data. Sample bottles for analytical parameters will be provided by the New Jersey Department of Health (NJDOH), lab certification ID#11036. Sample volume and container type will be as described in the respective laboratory's "Quality Manual" and/ or SOP, approved by the Office of Quality Assurance (OQA). Additional information on sample requirements is included in

Attachment B and information on laboratory methods is included in Attachment E.

11.2 Cleaning Sample Equipment: Because the possibility of contamination of samples is great, all sampling devices used to collect water quality samples for the parameters listed will be cleaned as thoroughly as possible between each use using a 1% solution of lab detergent (Liquinox) and ultra-pure deionized water, followed by a thorough rinse with deionized (PICO) water. Additionally, during months with metal parameters being analyzed, sampling equipment will be acid rinsed with a 5% HCL solution, followed by a thorough rinse with ultra-pure deionized water. All equipment cleaning will be performed at BFBM's preparation laboratory.

11.3 Field Precautions for Invasive Species: To prevent the potential spread of nuisance or invasive organisms such as Didymosphenia sp. from stream to stream, all nets, waders, etc. will be decontaminated in the field between sites by spraying with an antibacterial spray such as Fantastik Heavy Duty All Purpose Cleaner (active ingredients; dimethyl benzyl ammonium chlorides and ethylbenzyl ammonium chlorides). Also, the use of felt-soled waders will be avoided.

11.4 In-Stream Analytical Sampling Procedures and Parameters:
The collection of water quality samples will be accomplished using the Equal Width Increment (EWI) sampling method and a splitter churn to obtain cross sectional composite samples. Samples will be collected as per "NJDEP Field Sampling Procedures Manual," August 2005 Section 6.8.2; the document available online at the NJDEP's webpage, <http://www.state.nj.us/dep/srp/guidance/fspm/ >. (The Field Sampling Procedures Manual is currently being updated and the sections are subject to change in the update. Chapters 1, 2, and 4 have been updated on the website). Field readings for analyze immediately parameters (dissolved oxygen, pH, specific conductance, water temperature, air temperature and turbidity) will be made at each site during each sampling event. The chemical and field parameters are listed in Attachment B.
Discharge measurements will be made at each station (where applicable) during each sampling event using BFBM standard operating procedures (Attachments C and D) or United States Geological Survey procedures: https://pubs.usgs.gov/tm/tm3-a8/pdf/tm3-a8.pdf

12.0 Data Quality/Quality Control Requirements

Sampling Locations: Sampling locations are established using ESRI Geographic Information System Software (ARCGIS Desktop version 10.6 or later or comparable product). Sampling locations are then verified in the field using latitudinal and longitudinal coordinates with a Global Positioning System Device (GPS) (Garmin NUVI, Garmin GPS64 or Trimble GeoXT). In

addition photos will be taken and sampling sketches will be made for each location.

12.1 Testing by BFBM

The Bureau of Freshwater and Biological Monitoring is certified by DEP's Office of Quality Assurance for specific conductance, pH, dissolved oxygen, water temperature and turbidity measurements.

All pH meters, dissolved oxygen meters, conductivity meters and thermometers shall be operated and maintained according to the "Regulations Governing the Certification of Laboratories and Environmental Measurements", N.J.A.C. 7:18. BFBM is certified by the Office of Quality Assurance (certified lab ID # 11896) for all parameters listed below:

Temperature, pH, conductance and DO are measured using a Hach model # HQ40D. The Hach HQ40D is a multi-parameter water quality system that combines temperature, pH, conductance, and luminescent dissolved oxygen (LDO) probes into one meter.

Temperature: The probe is calibrated with a NIST certified thermometer on a quarterly basis. Records of the calibration shall be maintained by the BFBM.

pH: The probe is calibrated daily per the manufacturer recommendations. The pH meter is calibrated each day of use, including calibration with two standard pH buffers bracketing the value to be measured. After calibration, a standard buffer with pH within the calibration range shall be measured without any control adjustments to check the calibration. When the pH meter is in use for longer than a 3-hour period, the pH of the third buffer shall be checked once every three hours. If the pH differs by more than +/- 0.2 pH units from the standard buffer value, the meter shall be recalibrated. Records of all calibrations and calibration checks shall be maintained in the field log.

Conductance: The probe is calibrated daily per the manufacturer recommendations. The probe is calibrated each day of use with a certified standard which corresponds to the expected range of the values to be measured. Records of all calibrations and calibration checks shall be maintained in the field log.

DO: A Winkler check is performed on a weekly basis and the meter (Hach HQ40D) is barometrically compensated and checked at each sampling site. Records of all calibrations and calibration checks shall be maintained in the field log.

Turbidity: HACH Model 2100Q turbidimeter is calibrated on a quarterly basis per manufacturer recommendations. The meter is then checked with certified standards for accuracy within the calibration range during each day of use. Records of all calibrations and calibration checks will be maintained and dated in individually assigned field log books by each staff member participating in this project.

Other Parameters:
Barometer: Thommen TX Mechanical Barometer. Measured for LDO meter compensation only. Not used for project's data objectives.
Ambient Air Temperature: Measured for general information purposes only. Not used for project's data objectives.

Relevant Documents
Bureau of Water Monitoring Certified SOP, for field measurements and calibrations.
NJDEP Field Sampling Procedures Manual (2005).
NJAC 7:18 - Regulations Governing the Certification of Laboratories and Environmental Measurements.

12.3 Additional Testing performed by a NJ Certified Laboratory

Analytical samples will be delivered to the New Jersey Department of Health. Testing will be done by a method for which the laboratory has certification (New Jersey Department of Health-Public Health and Environmental Laboratories; laboratory certification number 11036) for all parameters listed in Table 6 on page 20. Quality control procedures (including required calibrations and quality control procedures required by regulation or by the method) shall be defined in the laboratory's Quality Manual (NJ Department of Health Quality Manual: Environmental and Chemical Laboratory Services Revised 4 (6/17/21) or Standard Operating Procedures (SOPs) listed in Attachment E. The QM and SOPs must be approved by the OQA.

NJDOH Analytical SOPs and the Quality Manual are reviewed annually and are subject to change, therefore the revisions identified in this QAPP may or may not be current. Based on the date the samples are submitted, the current SOP will be followed. All archived SOPs are kept by NJDOH on the network server.

13.0 Sampling Schedule

Sampling frequencies for conventional physical/ chemical parameters (nutrients, suspended solids, chlorides, etc.) and field parameters will be sampled monthly with the exception of January and November, for the two-year period. Metals monitoring will also occur in the months of February, June, August, and October

of the 2022-2023 cycle. Discharge measurements will be made during each sampling event when possible.

14.0 Resource Needs

Approximately 3 FTEs will be required for this project.

15.0 Quality Assurance

15.1 Sampling Locations: All sampling locations will be established and verified during each sampling visit using global positioning system device (Garmin NUVI, Garmin GPS64, or Trimble GeoXT).

15.2 Laboratory Analysis: All physical/ chemical parameters will be analyzed by a qualified New Jersey certified laboratory. Any laboratory used shall be certified by NJDEP's OQA for the requested parameters. The reporting levels listed in Attachment B are required for this project.

15.3 Sample Containers: Sample containers shall be dedicated, single-use. Sample containers shall be provided by the NJ certified laboratory.

15.4 Sample Retention: All samples must be retained for the duration of each analytes respective holding time.

15.5 Chain of Custody: Chain of custody forms (Attachment F) are required for all samples forwarded to a NJ certified laboratory for testing. Information to be recorded includes all information required by N.J.A.C. 7:18-5.6(d) and 8.5(c).

15.6 Sample Blanks/Replicates: For this project, BFBM's requirements are that each staff member participating in this project will be required to submit one annual field blank sample and one annual replicate sample for all discrete parameters listed in Table 6 on page 20. In addition, duplicate samples are analyzed for analyze immediately parameters (dissolved oxygen, Ph, specific conductance, turbidity, and water temperature. Field blank samples for mercury will be collected once per every ten environmental samples. Field blanks and replicates will be collected during metals sampling. If blank or replicate samples reveal any sampling deficiencies, an internal field audit will be performed on the relevant staff member(s) by the Project Officer or Supervisor. In addition, the staff member(s) may be subject to an audit by NJDEP's Office of Quality Assurance.

16.0 Data Validation

The Project Officer is responsible for all data validation. If apparent anomalous data is suspected the Project Officer and/or the Supervisor will review the sampling procedures with the field sampler to make sure the proper collection and preservation procedures were followed. Additionally, for nutrient parameters (particularly Ammonia, TKN, Nitrate + Nitrite and Phosphorus), the field sampler, Project Officer and/or the Supervisor may perform further water quality logic tests on the suspect data, as described in the U.S. Geological Survey Open File Report 02/383; 2003, entitled, *"Methods For Quality Assurance Review of Water Quality Data in New Jersey."*

If the data is still suspect, the NJ certified laboratory will be contacted. An internal review of their laboratory procedures and/or calculations used in the analysis of the suspect sample, with special emphasis on transcription of data to assure that no transposition of figures occurred will be conducted. The NJ certified laboratory will be asked to check on equipment calibration. They may be further requested to reanalyze the retained portion of the sample. (Samples are to be retained by the laboratory for the duration of each analytes respective holding time.)

If no problems are found in the analytical laboratory procedures, the data may then be compared to any historical data that might have been collected at the same site prior to the most recent sampling event to see if similar anomalies might have been found previously. The suspect data may also be compared to literature values or standard analytical treatises to verify whether the results are within the limits of accuracy of the test method.

17.0 Data Storage

Analytical data for discrete samples submitted to laboratory and data from analyze immediately parameters will be entered into USEPA's Water Quality Data Exchange (WQx) and will be accessible through the USEPA, USGS and National Water Monitoring Council's Water Quality Portal by the end of the calendar year results are received from the analytical laboratory. All raw data records shall be maintained for a period of no less than five years. See Attachment B for Data Management information.

18.0 Performance System Audits

All NJ certified laboratories used are subject to audits and to the requirements of the OQA Laboratory Certification Program as well as internal performance evaluations. The OQA will be aware of field monitoring schedules for possible audits.

19.0 Data Reporting

19.1 Preliminary Reporting of Data

Preliminary analytical data will be reported to BFBM, from the laboratory employed for this project, in electronic format within 21 calendar days from receipt of sample. Samples which yield results considered anomalous by the Project Officer and/ or Supervisor will be validated as specified in section 16.0, Data Validation, before the holding time of the retained sample is expired. If the results remain suspect after an internal review of the laboratory procedures, calculations, and/or on transcription of data has been conducted, then the sample shall be reanalyzed by the laboratory using the retained portion of the sample. This reanalysis shall be performed within the parameter holding time.

19.2 Final Reporting of Data

Final analytical data will be reported to BFBM, from the laboratory employed for this project, in the form of electronic and/ or hard copies of the lab sheets; or in a tabulated form within 40 calendar days from receipt of sample. All data shall be reported in a complete and concise fashion and shall meet the reporting requirements of NJAC 7:18. Routine quality control results must be retained on file for review by the BFBM and the OQA.

Final data and evaluations will be forwarded to the NJDEP Bureau of Environmental Analyses, Restoration and Standards for use in the generation of the biennial New Jersey Integrated Water Quality and Assessment Report [305(b) and 303(d)].

20.0 Assessment, Oversight, and Response

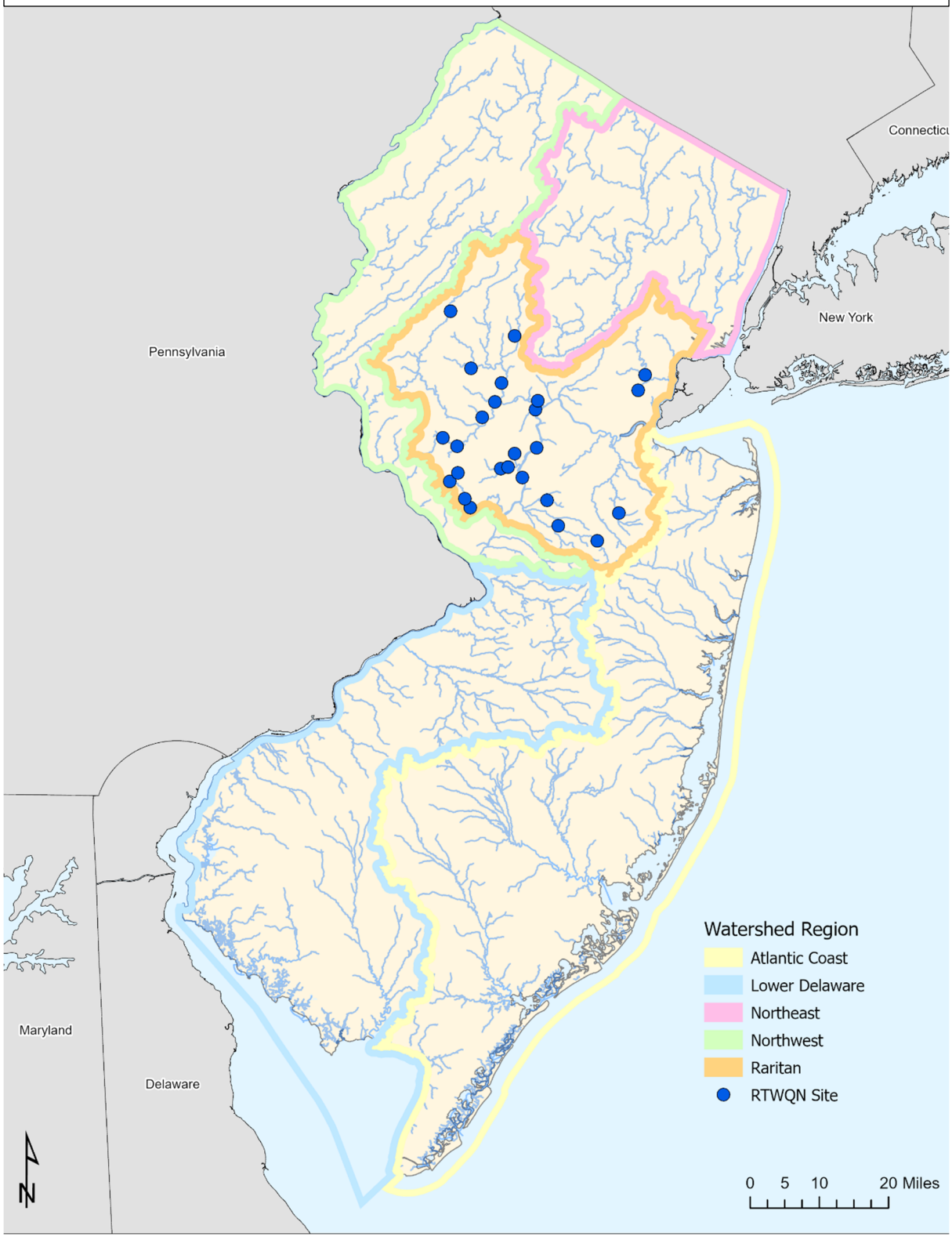
The Project Officer will be responsible for the oversight of all activities relating to this project. The Project Officer will assess field collection functions and make corrections when necessary to maintain the data accuracy as defined in this plan.

21.0 Corrective Action

All original signees of the QAPP will be notified of any major changes or modifications to this plan. This includes, by is not limited to, any changes regarding project timeline, network design, or data collection, as it relates to the objectives(s) and data accuracy required in this project.

Attachment A: Project Map & Information Tables

Regional Targeted Water Quality Network 2022-2023



Attachment B. Data Management Tables

For Data Management purposes, Water Chemistry is defined as parameters analyzed by a lab; Field measurements are defined as analyze immediately parameters.

Table 1. Monitoring Locations

ID	LOCATION_NAME	LATITUDE	LONGITUDE	MUN	COUNTY	WQDE exists?	Type
01400540	MILLSTONE R NR MANALAPAN NJ	40.2619	-74.4201	MILLSTONE TWP	MONMOUTH	yes	River/Stream
AN0382C	MILLSTONE RIVER AT CRANBURY RD	40.293235	-74.526912	EAST WINDSOR TWP	MERCER	yes	River/Stream
BFBM000213	MATCHAPONIX BK OFF RT 527	40.319875	-74.3606	MONROE TWP	MIDDLESEX	yes	River/Stream
AN0392	STONY BROOK OLD MILL RD	40.331277	-74.767166	HOPEWELL TWP	MERCER	yes	River/Stream
BFBM000111	SHALLOW BROOK ON SCOTT CORNER ROAD	40.346816	-74.557072	SOUTH BRUNSWICK TWP	MIDDLESEX	yes	River/Stream
BFBM000011	STONY BROOK ON TITUS MILL ROAD	40.349373	-74.782116	HOPEWELL TWP	MERCER	yes	River/Stream
AN0390A	STONY BROOK OFF RT. 31	40.385812	-74.824141	EAST AMWELL TWP	HUNTERDON	yes	River/Stream
01400870	STONY BROOK TRIB 3 NEAR HOPEWELL	40.403333	-74.801667	HOPEWELL TWP	MERCER	yes	River/Stream
01401595	ROCK BROOK ON BURNT HILL RD IN MONTGOMERY TWP	40.41302	-74.68403	MONTGOMERY TWP	SOMERSET	yes	River/Stream
FIBI089	BEDEN BROOK , OPOSSUM RD	40.416	-74.6646	MONTGOMERY TWP	SOMERSET	yes	River/Stream
FIBI016	PIKE RUN	40.444698	-74.645834	MONTGOMERY TWP	SOMERSET	yes	River/Stream
AN0407	TEN MILE RUN CANAL RD	40.456416	-74.585722	FRANKLIN TWP	SOMERSET	yes	River/Stream
BFBM000009	BACK BROOK ON WELISEWITZ RD	40.459721	-74.804672	EAST AMWELL TWP	HUNTERDON	yes	River/Stream
FIBI023	NESHANIC RIVER	40.477343	-74.843039	RARITAN TWP	HUNTERDON	yes	River/Stream
01398090	PLEASANT RUN AT NESHANIC STATION NJ	40.520046	-74.735689	BRANCHBURG TWP	SOMERSET	yes	River/Stream

ID	LOCATION_NAME	LATITUDE	LONGITUDE	MUN	COUNTY	WQDE exists?	Type
BFBM000045	ROYCE BROOK ON MAIN STREET	40.536995	-74.589634	MANVILLE BORO	SOMERSET	yes	River/Stream
01398110	HOLLAND BK SOUTH BRANCH RD	40.553194	-74.700527	BRANCHBURG TWP	SOMERSET	yes	River/Stream
AN0377A	RARITAN R AT RT. 533	40.55516	-74.583309	MANVILLE BORO	SOMERSET	yes	River/Stream
FIBI017a	SOUTH BRANCH RAHWAY RIVER	40.577472	-74.307192	WOODBRIDGE TWP	MIDDLESEX	yes	River/Stream
01399900	CHAMBERS BK AT NORTH BRANCH DEPOT NJ	40.592358	-74.683011	BRANCHBURG TWP	SOMERSET	yes	River/Stream
FIBI084	ROBINSONS BRANCH , CENTRAL AVE	40.6095	-74.2876	RAHWAY CITY	UNION	yes	River/Stream
BFBM000016	SOUTH BRANCH ROCKAWAY CREEK ON ROUTE 22	40.623468	-74.766616	READINGTON TWP	HUNTERDON	yes	River/Stream
BFBM000173	NORTH BRANCH RARITAN RIVER AT PEAPACK ROAD	40.69131309	-74.6470568	FAR HILLS BORO	SOMERSET	yes	River/Stream
BFBM000307	SOUTH BRANCH RARITAN RIVER AT VERNOY RD	40.74229726	-74.82393766	LEBANON TWP	HUNTERDON	no	River/Stream
BFBM000308	MILLSTONE RIVER AT RT 518	40.39954127	-74.62906154	ROCKY HILL BORO	SOMERSET	no	River/Stream

Table 2. Sample Types

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection	Habitat	Metrics	Indices
01400540	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
AN0382C	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000213	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
AN0392	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000111	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000011	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
AN0390A	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01400870	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01401595	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
FIBI089	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
FIBI016	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
AN0407	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000009	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
FIBI023	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01398090	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000045	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01398110	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
AN0377A	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
FIBI017a	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01399900	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
FIBI084	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000016	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000173	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000307	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000308	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO

Table 3. Partner Information

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection
01400540	DEP	DEP	DEP	NO	NO	NO	NO
AN0382C	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000213	DEP	DEP	DEP	NO	NO	NO	NO
AN0392	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000111	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000011	DEP	DEP	DEP	NO	NO	NO	NO
AN0390A	DEP	DEP	DEP	NO	NO	NO	NO
01400870	DEP	DEP	DEP	NO	NO	NO	NO
01401595	DEP	DEP	DEP	NO	NO	NO	NO
FIBI089	DEP	DEP	DEP	NO	NO	NO	NO
FIBI016	DEP	DEP	DEP	NO	NO	NO	NO
AN0407	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000009	DEP	DEP	DEP	NO	NO	NO	NO
FIBI023	DEP	DEP	DEP	NO	NO	NO	NO
01398090	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000045	DEP	DEP	DEP	NO	NO	NO	NO
01398110	DEP	DEP	DEP	NO	NO	NO	NO
AN0377A	DEP	DEP	DEP	NO	NO	NO	NO
FIBI017a	DEP	DEP	DEP	NO	NO	NO	NO
01399900	DEP	DEP	DEP	NO	NO	NO	NO
FIBI084	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000016	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000173	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000307	DEP	DEP	DEP	NO	NO	NO	NO
BFBM000308	DEP	DEP	DEP	NO	NO	NO	NO

Table 4. Field Parameters

Field Name	**WQDE Name**	**Media**	**Units**
DO	Dissolved oxygen (DO)	Water	mg/l
Water Temp	Temperature, Water	Water	deg C
Spec Cond	Specific conductance	Water	uS/cm
pH	pH	Water	None
Flow	Flow	Water	cfs
Barometric Pressure	Barometric Pressure	Air	mmHg
DO Sat	Dissolved oxygen saturation	Water	%
Temperature, air	Temperature, air	Air	deg C
Turbidity	Turbidity	Water	NTU

Table 5. Laboratory Parameters

Analysis (lab name)	EPA Characteristic Name	Method Speciation Name	Result Sample Fraction	Result Measure Unit	Result Value Type	Sample Collection Type	Sample Collection Equipment	Alternate Name
NEW JERSEY DEPARTMENT OF	Alkalinity, total	as CaCO3	Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Ammonia-nitrogen	as N	Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Calcium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Chloride		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Organic carbon		Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Organic carbon		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Hardness, carbonate		Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Chromium(VI)		Dissolved	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Magnesium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	as N	Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Phosphorus	as P	Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Phosphorus	as P	Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Potassium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Sodium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Sulfate		Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Total dissolved solids		Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Kjeldahl nitrogen	as N	Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Kjeldahl nitrogen	as N	Dissolved	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Total suspended solids		Total	mg/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Aluminum		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Arsenic		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Cadmium		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Chromium		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Copper		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Iron		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Lead		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Mercury		Total Recoverable	ng/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Nickel		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Selenium		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	
NEW JERSEY DEPARTMENT OF	Zinc		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other) Water Sampler (Other)	

Table 6. Laboratory Analytical Methods and Detection Limits

Parameter	Laboratory	Lab Number	Method	Method ID Context	Lower Reporting Limit	units	Method Detection Limit	units	Upper Reporting Limit (MPN/100 ml)	units	Holding Time	Preservative
Alkalinity	NEW JERSEY DEPARTMENT OF HEALTH - 11036		2320-B	APHA	1	mg/l	1	mg/l			14 days	Ice to 4 deg C
Ammonia (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		4500-NH3(H)	APHA	0.05	mg/l	0.023	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Calcium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	0.5	mg/l	0.12	mg/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Chloride (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		4500-CL(E)	APHA	2.5	mg/l	1.34	mg/l			28 days	Ice to 4 deg C
Organic Carbon (Total) (TOC)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		5310-C	APHA	1	mg/l	0.402	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Organic Carbon (Diss.) (DOC)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		5310-C	APHA	1	mg/l	0.454	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Hardness	NEW JERSEY DEPARTMENT OF HEALTH - 11036		2340B	APHA	0.662	mg/l	0.069	mg/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Chromium, Hexavalent (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		218.6	USEPA	0.025	ug/l	0.019	ug/l			28 days	, 5mls ammoniumhydroxide/ammonium sulfatelce to 4 deg C
Magnesium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	0.5	mg/l	0.056	mg/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Nitrite plus Nitrate (NO2-NO3) (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		4500-NO3(F)	APHA	0.012	mg/l	0.0069	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Phosphorus (Total)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		365.1	USEPA	0.01	mg/l	0.007	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Phosphorus (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		365.1	USEPA	0.01	mg/l	0.007	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Potassium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	0.5	mg/l	0.093	mg/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Sodium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	0.5	mg/l	0.045	mg/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Sulfate (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		375.2	USEPA	10	mg/l	2.84	mg/l			28 days	Ice to 4 deg C
Total Dissolved Solids	NEW JERSEY DEPARTMENT OF HEALTH - 11036		2540-C	APHA	1	mg/l	1	mg/l			7 days	Ice to 4 deg C
Kjeldahl Nitrogen (Total) (TKN)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		351.2	USEPA	0.1	mg/l	0.041	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Kjeldahl Nitrogen (Diss.) (TKN)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		351.2	USEPA	0.1	mg/l	0.041	mg/l			28 days	H2SO4 to ph < 2, Ice to 4 deg C
Total Suspended Solids	NEW JERSEY DEPARTMENT OF HEALTH - 11036		2540-D	APHA	1	mg/l	1	mg/l			28 days	Ice to 4 deg C
Aluminum (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	50	ug/l	28.7	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Arsenic (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8 (W) Ultra Trace ICPMS	USEPA	10	ng/l	9	ng/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Cadmium (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8 (W) Ultra Trace ICPMS	USEPA	10	ng/l	6.68	ng/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Chromium (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	1	ug/l	0.563	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Copper (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8(W)	USEPA	1	ug/l	0.032	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Iron (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.7(W)	USEPA	20	ug/l	18.5	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Lead (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8(W)	USEPA	0.1	ug/l	0.013	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Mercury (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		1631	USEPA	0.2	ng/l	0.158	ng/l			90 days	BrCl, Ice to 4 deg C
Nickel (Total rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8(W)	USEPA	1	ug/l	0.409	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Selenium (Total rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8(W)	USEPA	0.1	ug/l	0.097	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C
Zinc (Total rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036		200.8(W)	USEPA	1	ug/l	0.267	ug/l			6 months	HNO3 to pH <2, Ice to 4 deg C

Table 7. Data Inventory Supplement

Geographic Regions		Raritan Region
Counties		Monmouth, Mercer, Union, Somerset, Middlesex, Hunterdon
Dates		April 2022-December 2023
Status		Starting-Discrete
Sample Frequency		Other (10x/Year)
Seasons Sampled		Spring, Summer, Fall, Winter
Waterbody Type		River/Stream
Salinity Category		Fresh
Tidal Influence		Non-Tidal & Tidal
Project Description		The Regional Targeted Water Quality Network (RTWQN) purpose is to collect discrete chemical water monitoring data. The project focuses on targeted regions with an increased temporal sampling frequency for greater comprehensive assessments.
Parameters analyzed type		Chemical/Physical (Conventional, Nutrients, Metals)

Table 8. Data Management Supplement

QAPP network path file location?	V:\LUM\BFBM\Bfbm\Quality Assurance Plans\Calendar Year 2020 QAPPS\
Where will data be recorded in field (media)	Paper
If on tablets or phones, will download at office occur or will you connect wirelessly?	N/A
If on tablets or phones, who will do the download?	N/A
If data collected electronically, where will it be stored?	WQDE
Format to be received from Lab	LIMS
Method of receipt from lab/s	
Personnel receiving outside lab data	Leigh Lager
Is data expected to go to WQDE/STORET?	Yes
Data manager - (Bureau and Name)	BFBM Leigh Lager

Attachment C: Bureau of Freshwater and Biological Monitoring Standard Operating Procedures for Making Discharge Measurements in Wadable, Non-tidal Freshwater Streams with a Handheld Acoustic Doppler Velocimeter

Standard Operating Procedure for Making Discharge Measurements in Wadable, Non-tidal, Freshwater Streams with a Handheld Acoustic Doppler Velocimeter (ADV); revised 12/18/2018

With additional guidance from the United States Geological Survey, the New Jersey Department of Environmental Protection's Bureau of Fresh Water and Biological Monitoring (NJ DEP/BFBM) has adopted the Standard Operating Procedures for using a handheld ADV (Flowtracker and Flowtracker 2) from the manufacturer (Sontek) and the United States Geological Survey Techniques of Water-Resources Investigations Reports (https://pubs.usgs.gov/twri/index-last.html)

I. **Diagnostic Test Before Use** – Before any sampling run, or quarterly, a system diagnostics test called a "beam check" should be performed in a lab environment. A beam check should show that signal amplitude plots from each probe are roughly the same and should show noticeable peaks for "sample volume', "boundary reflection" and "noise level". If not, it is possible the probe(s) may be damaged. A complete description of "beam check" can be found in the manual. Should the meter fail the beam check, it will be removed from service and sent back to the manufacturer for repair.

II. **Site Selection** - To ensure that quality discharge measurements are made, it is important to select a location which minimizes the amount of interference and error during the measurement. Ideally, the location should be at a section of stream which is as straight as possible. If possible, avoid bends in the stream and areas of dead water. A general rule of thumb is that a transect location should be a distance (upstream and downstream) of 2X the width of the stream from any type of control, such as a riffle or pool or incoming tributary. Flow at the location should be as close to being laminar as possible. Once the location is selected, any moveable obstructions (small rocks, tree branches, macrophytes) should be removed from the transect.

III. **Setting up a tagline** - A tagline consisting of a tape measure will be set up perpendicular to the stream flow. The tape measure units should be in feet with sub-increments in 10ths of a foot. It is important that the line is taught and secure. Once established, a stream width will be determined from wetted edge to wetted edge. Edges (right or left) will be determined by looking downstream.

IV. **Measuring discharge** - Measuring discharge involves wading across the stream/ river while taking measurements of water depth and velocity at different locations (based on International Organization for Standardization/USGS procedures) along a transect. By combining this information, the total discharge can be calculated.

Preparation

Divide the river cross-section into a number of stations appropriate for its width.
According to the United States Geological Survey, 25-30 stations will give a representative measurement. There is a limitation however for streams <8.25 feet wide. The meter's probes collect measurements 4 inches from the probe face, perpendicular to stream flow. Increments less than 4 inches (0.3 feet) will result in overlapping measurements. In these cases, it is acceptable to have as many increments as the stream width will allow. Below is a chart that can be used to determine how many increments to use for streams less than 8.25'

Stream Width	Number of Increments
8’	23
7.5’	21
7’	20
6.5’	18
6’	17
5.5’	15
5’	14
4.5’	12
4’	11
3.5’	9
3’	7
2.5’	6
2'	5
1.5’	3
1’	2
<1’	1

These are general guidelines and actual on-site conditions will determine how many increments can be done for a given stream. It should also be noted that the meter is incapable of measuring flows at a depth less than 3”, so increments at those depths may need to be omitted. Depending on site conditions, alternate methods may be necessary to accurately measure discharge in very small streams. Non-wadable streams also require the use of different methods and equipment.

The starting edge is then established. The meter automatically defaults to left edge (descending bank or facing downstream), so it is advisable to begin on the left edge. If it is not possible, then the operator must change the starting edge to right (see manual). The operator must then establish the increments that will be used to measure velocity for the given stream width. For example, if the stream is 26 feet width, the increment is 1.04 feet (26/25). This will give the operator the minimum required number of stations (25).

Facing upstream, orient the hand held ADV perpendicular to the tagline Velocity data is recorded once per second for the entire averaging time (40 seconds), and then averaged to compute the mean velocity. Quality control data is also reviewed and displayed; you will be alerted to any unexpected values. If the velocity measurement is found to be unsatisfactory, you should repeat the measurement.

During the entire measurement, the probe’s X-axis must be maintained perpendicular to the tagline. The probe should be held away from underwater obstacles that may disturb the flow. Do not turn the hand held ADV into the direction of flow, as it will automatically account for flow direction when making discharge measurements.

Measuring Discharge

Follow manufacturer’s guidelines for the correct procedure for measuring discharge using the Flowtracker or Flowtracker 2. A copy of the Quick Start Guide for each meter is attached.

V. **Quality Assurance Procedures**

To ensure accuracy, NJDEP/BFBM will follow manufactures instructions for determining probe/meter condition. This consists of a beam check and ping test. The beam check is performed in a lab quarterly. The ping test is done in stream daily. These tests ensure that the meter and probe are operating within the manufacturer's guidelines. If either of these tests are failed, no discharge measurement will be made and the meter will be sent back to the manufacturer for repair.

NJDEP/BFBM has also developed a quality assurance check for utilizing the handheld ADV. Each staff member trained to obtain discharge measurements will be required to have a flow comparison check against an existing USGS real-time gage. Any flow comparison at a USGS real-time station that is off more than 20% will be repeated. If the repeated measurement is still off by more than 20%, then that staff member will undergo additional training. After the comparison is completed a hard copy will be stored of both the samplers discharge measurement and the ADR flow rate. Once staff are trained, they must perform these comparisons quarterly for a period of two years. If all eight comparisons are within 20% of the real-time gage readings, then comparisons will only be required once per year. If comparisons are not within 20% then, staff will be evaluated by a supervisor or project manager and will have to restart the two-year period of quarterly comparisons.

All discharge measurements made should have the flow rate (cubic feet per second) and also be designated a rank (see below) which determines the quality of measurement. NJDEP/BFBM ranks the quality of stream flow measurements by summing the International Organization of Standardization and Statistical uncertainty percentages that are calculated within the data file.

Sum of Percent Uncertainty:	**</= 5.0%**	**Very Good**
	> 5.0 and </= 10.0%	**Good**
	>10.0% and </= 20.0%	**Fair**
	> 20.0%	**Poor**

All ranks should be entered with the data on all lab analysis and field sheets.

Attachment D: Bureau of Freshwater and Biological Monitoring Standard Operating Procedures for Making Discharge Measurements in Non-Wadable, Non-Tidal, Freshwater Streams with a Boat-Mounted Acoustic Doppler Velocimeter.

Bureau of Freshwater and Biological Monitoring Standard Operating Procedure for Making Discharge Measurements in Non-Wadable, Non-tidal, Freshwater Streams with a boat mounted Acoustic Doppler Current Profiler); December 2018

With guidance provided by the manufacturer's manual and the United States Geological Survey field manual titled *Measuring Discharge with Acoustic Doppler Current Profilers from a Moving Boat*, the Bureau of Freshwater and Biological Monitoring (NJDEP-BFBM) has adopted the following Standard Operating Procedures.

USGS Field Manual:

Mueller, D.S., Wagner, C.R., Rehmel, M.S., Oberg, K.A,, and Rainville, Francois, 2013, Measuring discharge with acoustic Doppler current profilers from a moving boat (ver. 2.0, December 2013): U.S. Geological Survey Techniques and Methods, book 3, chap. A22, 95 p., http://dx.doi.org/10.3133/tm3A22.

- Discharge measurements will be made using the *SonTek/YSI RiverSurveyor M9* acoustic Doppler current profiler (ADCP). The ADCP will be mounted to an unmanned, tethered, boat. Operation will take place from the streambank utilizing a temporary cableway or from the downstream side of a bridge.
- Measurements with the boat-mounted ADCP will be performed by a two-person field crew. One member will be responsible for the moving and guiding of the tethered boat while communicating to the other field crew member who will be operating a field computer.
- Manufacturer provided software will be used collecting and analyzing of discharge data

2.0 Prior to Site Visit: In addition to the ADCP, boat, and field computer; ensure that all auxiliary equipment has been collected for a site visit. This includes GPS antenna, power & communications module, and USB radio antennas, and accompanying cable connectors. A checklist is recommended. Tether lines of site-appropriate length and carabiners should be checked for wear and tear to ensure that they are field ready. Check ADCP batteries to ensure there is a proper charge and voltage to conduct the discharge measurement and confirm that the field computer is fully charged. Spare batteries should also be brought.

3.0 Site Selection: Transects used for measurements should be in a straight channel with smooth laminar flow and depths suitable for the operation of a boat-mounted ADCP. Cross sections should avoid obstructions in the water column such as snag piles of large woody debris or heavy aquatic vegetation, to avoid any interference between beams from the ADCP to the stream bottom. If measuring from a bridge, measurements should be taken on the downstream side to provide better control of the tethered boat during operation. Measurement sites should

seek to avoid sources of magnetic influence. Such sources of interference can cause errors in calibration and headings from the internal compass in the ADCP.

4.0 Streamside and Roadside Safety: When working in and around a stream or river, life vests should be worn. When performing measurements from a bridge, additional safety procedures should be implemented. All field staff should wear a high-visibility vest. Furthermore, traffic cones should be placed around the work area, along with any additional precautions needed to aid motorists in early identification early and clear recognition of the work area.

5.0 Setup and Pre-Measurement Tests

5.1 Mounting of ADCP and accessories

5.1.1 The ADCP should be mounted so that the transducer depth is shallow as possible, while also ensuring that the transducers are completely submerged at all times during the discharge measurement.

5.1.2 Insert batteries into Power and Communications Module (PCM). As the PCM does not have an on/off button, it is recommended to not store the batteries within the unit when in storage in order to maximize battery life between charges.

5.1.3 Once equipment has been fully installed and connected, communication between the ADCP and field computer is to be established using USB radio and launching the *RiverSurveyor Live* software.

5.2 Diagnostic Test: After establishing communication, a system test should be performed which verifies that there is a proper battery voltage and that compass, recorder, and temperature sensors are in working condition. A system PASS will indicate that all components are functional for a discharge measurement.

5.3 Site information: The following site information should be recorded into the *RiverSurveyor* program before beginning any discharge measurement.

a. Site Name
b. Station Number
c. Location; include municipality and county
d. Party; operator of ADCP, field computer, and any other supporting staff
e. Boat/Motor
f. Measurement number
g. Comments; weather or stream conditions that may affect the discharge measurement.

5.4 System Settings

5.4.1 Transducer depth: This is the distance from the vertical beam of the mounted ADCP to the water surface and should be measured and entered into the *RiverSurveyor* program

5.4.2 Magnetic Declination: Variations in the magnetic field on the Earth's surface can result in an angular difference between the magnetic north and "true North". This variation, called magnetic declination, needs to be

accounted for when performing compass calibration at the site of discharge measurement. The magnetic declination is obtained by entering the site coordinates into a declination calculator provided by NOAA. Magnetic Field Calculator: https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml

5.5 Compass calibration: Prior to any measurements, a calibration of the unit's internal compass should be performed to ensure proper headings are recorded while moving across the transect. The compass calibration will be performed on-site, under similar environmental conditions where the measurement will occur. When possible the sources of potential magnetic interference are to be avoided. Examples include bridges or buildings with large amounts of ferromagnetic metals used in their construction. To perform the calibration, the operator will rotate the mounted ADCP in two complete circles while varying pitch and roll (in a figure-8 formation) and trying to simulate conditions that will be experienced when deployed. The *RiverSurveyor Live* program will indicate whether magnetic influence is acceptable and the calibration was successful with an error from calibration value of less than 0.5 degrees. Sometimes site locations do not allow for the elimination of magnetic influence needed for successful calibration. If a successful calibration on site is not attainable, the error in heading detected by the calibration should be noted by the field crew and considered when analyzing the quality of the discharge data.

5.6 Moving-Bed Test: The ADCP measures the velocity of the boat using bottom-tracking pings while moving along the transect. In some cases, moving-bed conditions may be present at the measurement site. This occurs when sediment moving along the streambed causes the measured boat velocity to be biased in the upstream direction. A stationary moving-bed test will be conducted at every first-time site visit and during preceding visits when moving bed conditions are suspected. Streams experiencing flooding conditions or high levels of sediment transport are the most likely candidates of streams that could have moving bed. The moving bed test includes selecting locations in the cross section where sediment transport along the streambed is suspected to be highest, thus giving the highest potential for moving-bed conditions. The tethered-boat with the ADCP should be held in a stationary position for a total of 5 minutes minimum while collecting samples. The stationary boat will appear to be moving upstream on the bottom-tracking plot if a moving-bed condition is present. If a moving bed is determined to be present, GPS will be used instead of the Bottom Tracking method to determine boat speed if possible.

5.7 Setting up edges: Prior to taking discharge measurements; cones, flagging tape, or another kind of visual aid will be place at both the estimated beginning and end edges on the left and right banks of the stream. The left and right bank is determined by facing downstream of the sampling location. The beginning and end edges should be in an area of suitable depth and velocity and placed far enough away from the water's edge to avoid interference from the beam (typically the width should be greater than or equal to the depth of the water at that location). A tagline or laser rangefinder will be used to

determine the distance from these edges to the nearest edge of water. The edge shape should also be determined which will be used in extrapolation of discharge data in the unmeasured area of stream between the edge of water and the edges of the measured transect. Edge shape will be categorized as a "sloped bank" or "vertical bank".

6.0 Performing Discharge Measurement: The discharge measurement is calculated by moving the boat-mounted ADCP across a transect that collects continuous measurements of water depth and velocity, and then combining this measurement this with estimated discharge of areas the ADCP cannot measure (stream edges and areas closest to the streambed and water surface).

6.1 Following configuration and pre-measurement tests, the tethered boat with the mounted ADCP should be positioned at the pre-determined starting edge. Data collection will begin by pressing "START" in the *RiverSurveyor Live* program.

6.2 Computer operator will press "START EDGE" and begin recording data. While holding the ADCP as stationary as possible, a minimum of 10 samples will be collected at the starting edge.

6.3 After collecting starting edge measurements, the crew member operating the field computer will press "START MOVING" and alert the operator of the tethered boat to begin moving across the transect.

6.4 Care is to be taken to made sure the speed and direction of the boat-mounted ADCP is as constant as possible while moving across the transect. This is to reduce errors and variability in measurements introduced by erratic movements by the boat. The boat speed should be less than or equal to the speed of the water in stream.

6.5 As the boat approaches the streambank opposite of the starting edge, start to slow the boat down and come to a gentle stop at the pre-determined ending edge.

6.6 Once the boat has reached the ending edge, maintain a stationary position and advise the operator of the field computer to press "END EDGE".

6.7 Similar to the starting edge; a minimum of 10 samples should be collected at the ending edge. Once satisfied, the computer operator will press "END TRANSECT". This will save the measurement and automatically open a new tab to begin a new transect.

6.8 Begin a new transect using the same procedure. The ending edge will now become the starting edge and vice versa. Reciprocal measurements should be collected to account for any directional bias.

6.9 Real-time QA/QC warnings are provided the *RiverSurveyor Live* software. These warnings should be checked by the field computer operator during the discharge measurement for any irregularities or possible sources of errors while moving across the transect.

6.10 Any measured edge discharges should not be greater than 5% of total discharge. If this occurs, consider moving the edge closer to the water's edge to capture more of the discharge within the measured area.

6.11 A minimum of 4 transects (2 reciprocal pairs) are to be collected. If after 4 measurements, all calculated flows are within 5% of the calculated mean, no additional measurements are required. If any discharge measurement is out of this

range, then two additional measurements will be made to smooth out variability between measurements.

7.0 Post-Processing: After retrieving the boat and mounted ADP from the stream, the collected discharge data stored on the unit should be immediately downloaded and backed up onto the field computer. Only after confirming data has been uploaded onto the computer, can the ADP and other equipment be packed up. Upon returning to the office, discharge data will be transferred from the field computer onto the DEP network.

8.0 Quality Assurance Procedures

8.1 To ensure equipment is in working-order, the following checks and tests will be performed on a quarterly basis:

8.1.1 A beam check using the BeamCheck test from software provided by the manufacturer. This test should be performed using multiple beam frequencies.

8.1.2 Cleaning of the transducers to remove the build-up of material on the transducer faces. This can be performed using a mild soap detergent and sponge.

8.1.3 Checks will be made to ensure that the software and firmware are up-to-date. The bureau will follow the guidance of the Hydroacoustic Work Group within the USGS Office of Surface Water. Recommendations from the work group are provided at the following website, https://hydroacoustics.usgs.gov/movingboat/m9s5.shtml

8.2 Staff members qualified for performing discharge measurements with the ADCP will be required to do a semi-annual flow measurement comparison at a site co-located with a USGS real-time gage. Flow comparisons should not differ by more than 5%. Any readings that differ more than 5% from that of the real-time gage will be repeated. If readings still differ by more than 5%, the ADP instrument will be inspected for any defects and field conditions will be considered for any possible influences. If no defects are detected, the staff member will undergo additional training and an internal field audit will be performed by the Project Officer or Supervisor. A hard copy of both completed comparison measurements and corresponding gage data will be stored and placed into records.

8.3 The quality of stream flow measurements with a boat-mounted ADCP will be calculated by determining the percent variation between measurements and the mean discharge. The following percentages will be used to rate the measurement.

1. Very good (</=2%)
2. Good (2% < and </=5%)
3. Fair (% 5< and </=8%)
4. Poor (>8%)

All projects and staff using the boat-mounted ADV should adhere to the Standard Operating Procedures listed.

Attachment E: NJDOH Laboratory Methods

Lab Method Number	Lab Method Revision Number	Reference Method	SOP Description	Date
ECLS-I-CVAFS-1	1	EPA 1631E	Mercury	12/13/21
ECLS-I-ICP-1	2	EPA 200.7	Aluminum, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Barium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Beryllium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Boron, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Cadmium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Calcium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Chromium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Cobalt, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Copper, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Hardness (Calcium)	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Hardness (Total)	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Iron, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Magnesium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Manganese, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Nickel, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Potassium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Sodium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Strontium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Tin, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Zinc, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Molybdenum, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Silica, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Silver, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Titanium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Vanadium, ICP	11/19/21
ECLS-I-ICPMS-1	2	EPA 200.8	Aluminum, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Antimony, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Arsenic, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Barium, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Beryllium, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Cadmium, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Chromium, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Copper, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Lead, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Manganese, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Nickel, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Thallium, ICPMS (WS)	11/10/21

Lab Method Number	Lab Method Revision Number	Reference Method	SOP Description	Date
ECLS-I-ICPMS-1	2	EPA 200.8	Zinc, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Mercury, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Molybdenum, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Selenium, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Uranium, ICPMS (WS)	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Uranium, Radiation	11/10/21
ECLS-I-ICPMS-1	2	EPA 200.8	Vanadium, ICPMS (WS)	11/10/21
ECLS-I-CVAA-2	1	EPA 245.1	Mercury, EPA 245.1	10/12/21
ECLS-I-ION-4	1	EPA 300.0	Bromide by Ion Chromatography	11/5/21
ECLS-I-ION-4	1	EPA 300.0	Chloride by Ion Chromatography	11/5/21
ECLS-I-ION-4	1	EPA 300.0	Fluoride by Ion Chromatography	11/5/21
ECLS-I-ION-4	1	EPA 300.0	Sulfate by Ion Chromatography	11/5/21
ECLS-I-FIA-6	1	EPA 335.4	Cyanide, Total	9/23/21
ECLS-I-FIA-5	1	EPA 351.2	Nitrogen, Total Kjeldahl (Dissolved)	1/14/21
ECLS-I-FIA-5	1	EPA 351.2	Nitrogen, Total Kjeldahl (Total)	1/14/21
ECLS-I-VIS-6	1	EPA 420.1	Phenols	11/15/21
ECLS-I-GEN-3	1	SM 2120 B	Color	6/17/21
ECLS-I-GEN-1	1	SM 2130B	Turbidity	10/12/21
ECLS-I-GEN-4	1	SM 2150B	Odor	10/12/21
ECLS-I-ALK-1	1	SM 2320B	Alkalinity	9/23/21
ECLS-I-GEN-2	1	SM 2510B	Conductivity	10/12/21
ECLS-I-GRAV-3	2	SM 2540B	Solids, Total (TS)	9/23/21
ECLS-I-GRAV-1	3	SM 2540C	Solids, Total Dissolved (TDS)	9/23/21
ECLS-I-GRAV-2	2	SM 2540D	Solids, Total Suspended (TSS)	9/23/21
ECLS-I-GRAV-4	2	SM 2540E	Solids, Total Volatile (TVS)	9/23/21
ECLS-I-ISE-1	1	SM 4500-F C	Fluoride by ISE	10/12/21
ECLS-I-PH-1	1	SM 4500H-B	pH	9/23/21
ECLS-I-FIA-3	1	SM 4500-NH3 H	Nitrogen, Ammonia - Distilled (Dissolved)	1/14/22
ECLS-I-FIA-3	1	SM 4500-NH3 H	Nitrogen, Ammonia - Distilled (Total)	1/14/22
ECLS-I-FIA-2	1	SM 4500-NH3 H	Nitrogen, Ammonia - Undistilled (Dissolved)	1/18/22
ECLS-I-FIA-2	1	SM 4500-NH3 H	Nitrogen, Ammonia - Undistilled (Total)	1/18/22
ECLS-I-FIA-1	2	SM 4500-NO3 F	Nitrogen, Nitrite (Total)	9/23/21
ECLS-I-FIA-1	2	SM 4500-NO3 F	Nitrogen, Nitrite (Dissolved)	9/23/21
ECLS-I-FIA-1	2	SM 4500-NO3 F	Nitrogen, Nitrite + Nitrate (Dissolved)	9/23/21

Lab Method Number	Lab Method Revision Number	Reference Method	SOP Description	Date
ECLS-I-FIA-1	2	SM 4500-NO3 F	Nitrogen, Nitrite + Nitrate (Total)	9/23/21
ECLS-I-O-1	1	SM 4500-O C	Dissolved Oxygen	1/18/22
ECLS-I-FIA-7	1	EPA 365.1	Phosphorus, Ortho (Dissolved)	10/1/21
ECLS-I-FIA-7	1	EPA 365.1	Phosphorus, Ortho (Total)	10/1/21
ECLS-I-OD-1	1	SM 5210B	CBOD	1/14/22
ECLS-I-OD-1	1	SM 5210B	BOD	1/14/22
ECLS-I-VIS-8	1	SM 5220 D	COD - Low Level	1/13/22
ECLS-I-TOC-2	1	SM 5310 C	Organic Carbon (Dissolved)	10/12/21
ECLS-I-TOC-2	1	SM 5310 C	Organic Carbon (Total)	10/12/21
ECLS-I-VIS-2	1	SM 5540 C	MBAS	11/5/21
ECLS-I-FIA-10	1	SM4500-Cl E	Chloride	1/18/22
ECLS-I-FIA-11	1	EPA 365.1	Total Phosphorous	1/18/22
ECLS-I-FIA-12	1	EPA 375.2	Sulfate	9/23/21
ECLS-I-ION-CR6	2	EPA 218.6	Chromium, Hexavalent	10/20/21
ECLS-I-CVAFS-1	1	EPA 1631E	Mercury	12/13/21
ECLS-I-ICP-1	2	EPA 200.7	Aluminum, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Barium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Beryllium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Boron, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Cadmium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Calcium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Chromium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Cobalt, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Copper, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Hardness (Calcium)	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Hardness (Total)	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Iron, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Magnesium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Manganese, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Nickel, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Potassium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Sodium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Strontium, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Tin, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Zinc, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Molybdenum, ICP	11/19/21
ECLS-I-ICP-1	2	EPA 200.7	Silica, ICP	11/19/21

Attachment F: NJDOH Chain of Custody

Field ID Number		Lab Sample Number (For Lab Use Only)

New Jersey Department of Health
Environmental and Chemical Laboratory Services
PO Box 361, Trenton, NJ 08625-0361
Phone: 609-530-2820

ORGANIC AND INORGANIC CHEMISTRY SAMPLE SUBMITTAL

(See Instructions)

AGENCY INFORMATION

Submitting Agency	Send Results To	Agency No.	Project Name
Street Address	Final Report Option ☐ Tier 1 ☐ Tier 2 Electronic Report Option ☐ EDD ☐ E-2	Would you like copies of the internal chain of custody forms sent with your report? ☐ Yes ☐ No	Project Code Memo Number
City, State, Zip Code	Phone	Fax	Email

SAMPLE INFORMATION

Sample Point/Station ID Number/Water Facility ID	Collection Date (YY/MM/DD) __ __ / __ __ / __ __	**Sample Type** **Non-Potable:** ☐ Stream/Surface ☐ Tissue ☐ Ground Water ☐ Sewage: ☐ Raw ☐ Effluent ☐ Private Well ☐ Septic ☐ Industrial: ☐ Raw ☐ Effluent ☐ Ocean/Saline ☐ Sediment **Potable:** ☐ Groundwater Rule ☐ At Source ☐ Source ☐ Flushed ☐ Confirmation ☐ 1st Draw ☐ Raw ☐ Lead Source Line ☐ Finished ☐ Surface H_2O Intake ☐ Private Well ☐ Distribution System **Fraction:** ☐ Total ☐ Dissolved **Other:** ☐ _____ **Priority:** ☐ Routine ☐ Priority ☐ Emergency
Sampling Site/Facility/Supply/Location/Sampling Point ID	Coll. Time (24h) Start __ __ __ __ Coll. Time (24h) End __ __ __ __	
Waterbody Name	Sample Retention Retain? ☐ No ☐ Yes Duration _____	
Municipality/County	Type of Sampling Event ☐ Regular ☐ Compliance ☐ Repeat ☐ Non-Regulatory ☐ Other	
Sampling Point Street Address	If Repeat or GWR, List Original Lab Sample No.	
	Sample Collector	
PWSID	Trip #	

FIELD INFORMATION

Air Temp °C	Water Temp °C	Stream Flow-CFS
Weather Conditions	Sample pH (Field)	Gage Height-Ft.
Preserved in: ☐ Field ☐ Lab Date: __ __ / __ __ / __ __ Time: __ __ __ __	DO (mg/l)	Spec.Cond. (µS/CM)
	DO% Sat	Salinity (ppm)
Chlorine Residual	Sample Depth Ft.	Tide Stage
Comments/Field Checks	Barometric Pressure (mmHg)	Turbidity (NTU)

ANALYSIS REQUESTS

Metals

☐ Ag..... Silver ☐ Mg..... Magnesium
☐ Al.....Aluminum ☐ Mn..... Manganese
☐ As..... Arsenic ☐ Mo.... Molybdenum
☐ B.....Boron ☐ Na.....Sodium
☐ Ba.....Barium ☐ Ni.....Nickel
☐ Be.....Beryllium ☐ Pb.....Lead
☐ Ca..... Calcium ☐ Sb.....Antimony
☐ Cd.....Cadmium ☐ Se.....Selenium
☐ Co.....Cobalt ☐ Si.....Silica
☐ CR-T....Chromium ☐ Tl.....Thallium
☐ Cu.....Copper ☐ U.....Uranium
☐ Fe.....Iron ☐ V.....Vanadium
☐ K.....Potassium ☐ Zn.....Zinc

Preferred Methodology

☐ EPA 200.7 / 200.9 ☐ EPA 200.8

Residues

☐ Total Suspended Solids (TSS)
☐ Total Solids (TS)
☐ Total Dissolved Solids (TDS)
☐ Settleable Solids (SS)
☐ Total Volatile Solids (TVS)

General

☐ Alkalinity ☐ Fluoride by IC
☐ Bromide by IC ☐ Hardness
☐ Chloride ☐ MBAS
☐ Chloride by IC ☐ Odor
☐ Chromium, Hexavalent ☐ pH
☐ Chromium, Hexavalent by IC ☐ Phenols (PW)
☐ Color ☐ Phenols (NPW)
☐ Conductance ☐ Sulfate by IC
☐ Cyanide ☐ Sulfate Lachat
☐ Dissolved Oxygen ☐ Turbidity
☐ Fluoride

Mercury

☐ Mercury by EPA 245.1
☐ Low Level Mercury EPA 1631E

Nutrients

☐ Nitrite ☐ Nitrite + Nitrate
☐ Total Phosphorus ☐ Ortho Phosphorus
☐ Ammonia ☐ Total Kjeldahl Nitrogen (TKN)
☐ Nitrate (Calculated)
☐ Nitrogen, Total (Calculated)

Organics (Drinking Water)

☐ EPA 504.1 - EDB, DBCP,123TCP
☐ EPA 505 - Chlordane
☐ EPA 505 - Toxaphene
☐ EPA 507 - N and P containing Pesticides
☐ EPA 515.3 - Chlorinated Acid Herbicides
☐ EPA 524.2 - Purgeables
☐ EPA 525.2 - Liquid-Solid Extractables
☐ EPA 531.1 - N-Methylcarbamoyloximes and N-Methylcarbamates

Organics (Non-Potable Water)

☐ EPA 624 – Purgeables
☐ EPA 625 - Base/Neutral and Acid Extractables

Demands

☐ Total Organic Carbon (TOC)
☐ Dissolved Organic Carbon (DOC)
☐ Chemical Oxygen Demand (COD)

Suggested Dilutions

☐ BOD5 ☐ BOD20 ____ ____ ____
☐ CBOD5 ☐ CBOD20 ____ ____ ____

Other

☐ _____ ☐ _____ ☐ _____

Relinquished By:	Affiliation:	Received By:	Affiliation:	Date/Time	Reason for Custody Change
Name (Print): _____		Name (Print): _____			
Signature: _____	_____	Signature: _____	_____	_____	_____
Name (Print): _____		Name (Print): _____			
Signature: _____	_____	Signature: _____	_____	_____	_____

CHEM-44
FEB 16