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

Upper Delaware Region

2017-2019 Cycle

(Amended 03/2018)

Prepared by:_____ Date: _____
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Summary of Amendments

3/1/2018 New Project Officer

Beginning 3/13/2018, Aluminum will be a requested parameter for analysis at all locations requiring metals samples. The analysis requested will utilize USEPA method 200.7(W). In addition, the analyses for arsenic and cadmium will now utilize method 200.8 Ultra-trace ICMPS, WP. The tables of laboratory parameters and analytical methods and detection limits in Attachment A have been updated to reflect these changes.

Table of Contents

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: November 2017- September, 2019.

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

5.0 Project Officer: Kevin Biallas, Project Officer, NJDEP, BFBM **(Kevin.Biallas@dep.nj.gov)**

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/ >.

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 Department initiated the Barnegat Bay Ten-Point Action Plan in 2010 as a model for regional water quality assessment and restoration. 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 recent USEPA guidance related to strategies and priorities for water quality restoration, "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 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 new 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 for conventional parameters is 20 samples and for metals and toxic pollutants it is 8 samples. These samples will be collected over at least a 2-year period within a specified five-year reporting period. The assessment methodology including sample size requirements are discussed in details in the 2014 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 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. 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)

The final outcome was WM&S selecting total of twenty-five monitoring stations for the Regional Targeted Water Quality Monitoring Network, 2017-2019 Cycle.

8.0 Project Description

For the period between November, 2017 and September , 2019, the RTWQN will consist of twenty-five regional targeted water quality monitoring stations. Sampling of sites will commence November 2017.

Sample commencement was initially slated for October 2017. Due to a lengthy approval process, the network sampling was not cleared to begin until late October. To compensate, sampling was designated to begin in November, normally an 'Off' month.

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 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 2014 Methods Document. Section 7.0 "Project Background" summarizes the new assessment approach that includes regionally focused assessments and more frequent data requirements. Starting in 2017, sampling will begin in selected regions to collect data that will be used in the 2020 Integrated Report.

10.0 Monitoring Network Design

Water Quality Stations: Twenty-five stations (list included in Attachment A) 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 (October, February, June, August). 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 with the exception of November and January. Discharge (flow) measurements at each non-tidal 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 Attachment

C. At tidally impacted sites, monitoring will be at low, slack tide. Metals monitoring will occur four times per year (October, February, June, August) to produce both high flow and low flow data. Sample bottles for analytical parameters will be provided by the contracted New Jersey certified laboratory. 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). This information is also included in Attachment B.

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 Deionized (PICO) water, followed by a thorough rinse with deionized (PICO) water. All equipment cleaning will be performed at BFBM's preparation laboratory. Metals samples will be collected via a center of flow grab sample directly into a new one-use sample container, so no additional cleaning procedures are necessary.

11.3 Field Precautions for Invasives: 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) and rinsing with tap water. 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. Water column sample collection for metals will be center of flow grab 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/ >.
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 Attachment B.
Discharge measurements will be made at each station (where applicable) during each sampling event using BFBM standard operating procedures (Attachment C) or United States Geological Survey procedures http://training.usgs.gov/TEL/Nolan/SWProcedures/Index.html

12.0 Data Quality/Quality Control Requirements

12.1 Sampling Locations: Sampling locations will be established using an approved global positioning system (GPS) device (Trimble Geo Explorer 3 or newer model). Subsequently, all sampling locations will be verified by sampling staff during each sampling event using a GPS device. In addition photos will be taken and site sketches will be made for each sampling location.

12.2 Testing by BFBM

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. (**BFBM Standardized Analytical Method for Temperature (11.1300), 2005**

pH: The probe is calibrated on a daily basis 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. (**BFBM Standardized Analytical Method for Determining pH by the Electrometric Method, 2008)**

Conductance: The probe is calibrated on a daily basis 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. **(BFBM Standardized Analytical Method for Specific Conductance (10.0870), 2006)**

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. (**BFBM Standard Analytical Method for Dissolved Oxygen by the Luminescence Measurement of Dissolved Oxygen (LDO), 2013)**

Turbidity: HACH Model 2100P turbidimeter is calibrated once a month 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 shall be maintained in the field log. **(BFBM Standard Operating Procedure for Field Turbidity Measurement, 2000)**

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
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 a NJ certified laboratory. 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). 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 7/1/14) 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 November and January per year, for the two year period. Metals monitoring will also occur in the months of October, February, June, and August per calendar year, for the two year period. Discharge measurements will be made during each sampling event by USGS or BFBM staff utilizing the same procedures.

Due to a late approval, sampling did not begin in October as originally planned. Sampling was started in November 2017. For the month of November, metals monitoring was performed to compensate for October's absence.

14.0 Quality Assurance

14.1 Sampling Locations: All sampling locations will be established and verified during each sampling visit using global positioning system (GPS) device.

14.2 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.

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

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

14.5 Chain of Custody: Chain of custody forms 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).

14.6 Sample Blanks/Replicates: Each staff member participating in this project will submit two annual field blank samples and two annual replicate samples for all parameters. One field blank and replicate will be collected during a metals sampling run and one field blank and replicate will be collected during a routine sampling run. 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.

15.0 Data Validation

The Project Officer and the Supervisor are responsible for all initial 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 or not the results are within the limits of accuracy of the test method.

16.0 Data Storage

Data will be stored locally in electronic format (MS Access). Water quality data will be entered into New Jersey's Water Quality Data Exchange (WQDE) and USEPA STORET Data Warehouse by June of the following year. The data will be available to all users through the Water Quality portal. All raw data records shall be maintained for a period of no less than five years. Attachment D contains the complete data storage and availability.

17.0 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 notified of field monitoring schedules for possible audits.

18.0 Data Reporting

18.1 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)].

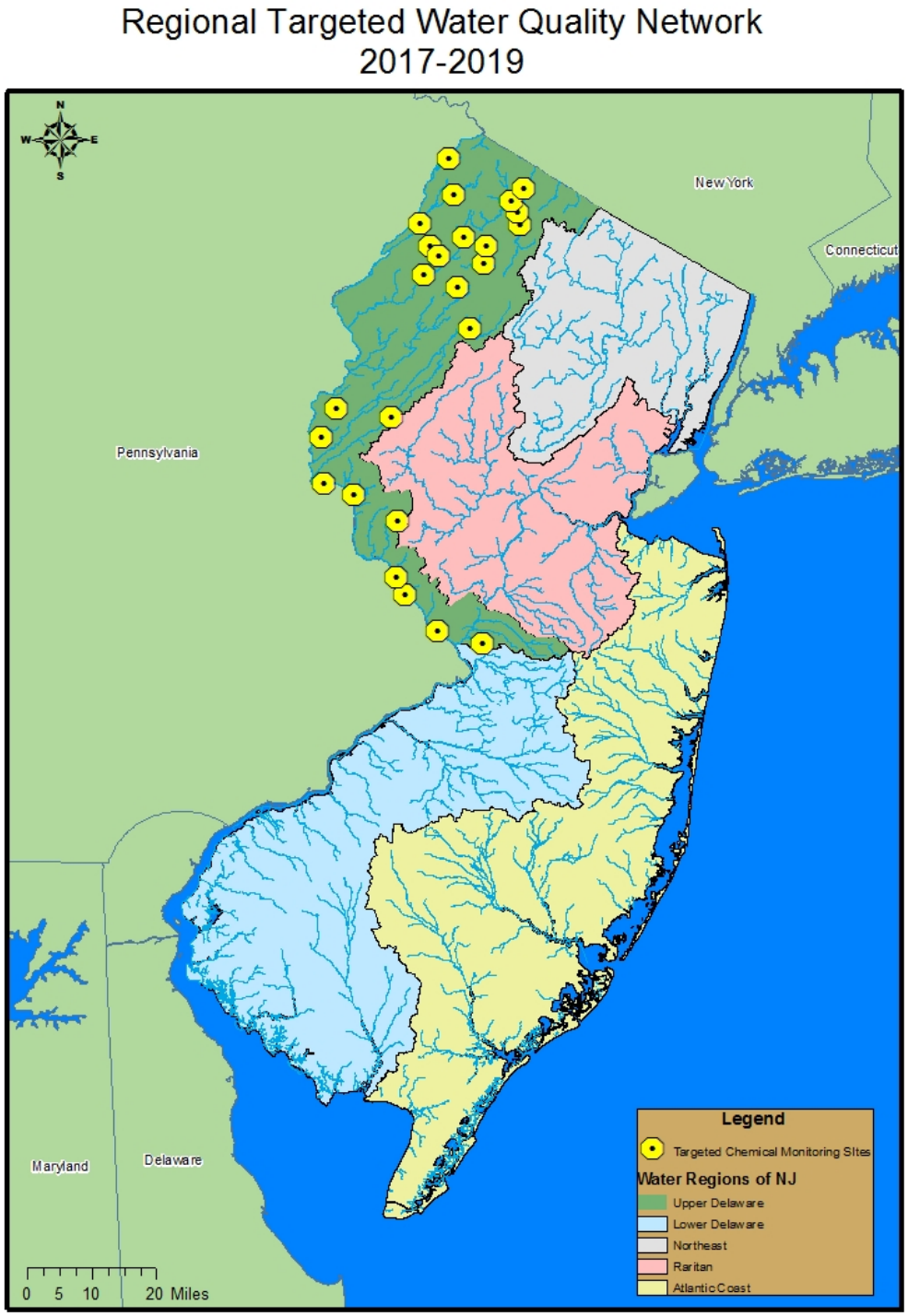
19.0 Assessment, Oversight, and Response

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.

20.0 Corrective Action

If any changes or modifications are made to this plan regarding data collection, as it relates to the objectives(s) and data accuracy required in this project, all original signees of the QAPP will be notified.

Attachment A: Project Map & Information Tables



Geographic Regions		Upper Delaware
Counties		Hunterdon, Mercer, Morris, Sussex, Warren
Dates		October 2017-September 2019
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
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)

QAPP network path file location?	V:\LUM\BFBM\Bfbm\Quality Assurance Plans\Calendar Year 2017 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	Carol O'Donnel-Kee
Is data expected to go to WQDE/STORET?	Yes
Data manager - (Bureau and Name)	BFBM Leigh Lager

Station ID(WQDE compliant and referenced)	Waterbody/Location	Latitude-dd	Longitude-dd	County	Site exists in WQDE already?	Location Type
01455700	Musconetcong Rvr off River Rd thru Riverside Park	40.92013	-74.7309399	MORRIS	Yes	River/Stream
01443468	Indian Ck (Troy bk trib) at Swartswood Rd	41.082807	-74.820873	SUSSEX	No	River/Stream
01444970	Pequest Rvr at Rt 206 Springdale	41.014318	-74.7667391	SUSSEX	Yes	River/Stream
01462200	Moores Ck at Rt 29	40.324107	-74.9168594	MERCER	Yes	River/Stream
AN0051	Lopatcong Ck at Rt 647 (Harmony/Brass Castle Rd)	40.740182	-75.1223107	WARREN	Yes	River/Stream
01461262	Plum Ck off Stone Signpost Rd	40.490266	-74.9388182	HUNTERDON	No	River/Stream
01463200	Gold Run at Lower Ferry Rd	40.244167	-74.8208905	MERCER	Yes	River/Stream
01443462	Swartzwood Ck at Mt Benevolence Rd	41.105981	-74.8492762	SUSSEX	Yes	River/Stream
01463920	Pond Run at Rt 533 (Whitehorse/Mercerville Rd)	40.215644	-74.6903837	MERCER	Yes	River/Stream
01455099	Lopatcong Ck at Lock St at Phillipsburg	40.677288	-75.1667537	WARREN	Yes	River/Stream
01443476	Paulins Kill UNT Western channel at Saddle Back Rd	41.041188	-74.868468	SUSSEX	Yes	River/Stream
01457930	Delaware Rvrr UNT off Riegelsville Rd at Powerline	40.572463	-75.1559652	HUNTERDON	Yes	River/Stream
01458400	Harihokake Ck at Rt 619 (Frenchtown Rd)	40.548149	-75.0687437	HUNTERDON	Yes	River/Stream
01438517	White Bk at Old Mine Rd Montague	41.300833	-74.7950001	SUSSEX	Yes	River/Stream
01367729	Walkill Rvr at Rt 94 Hamburg	41.15257	-74.5818031	SUSSEX	Yes	River/Stream
01456590	Musconetcong Rvr at New Hampton Rd	40.723134	-74.9598725	HUNTERDON	Yes	River/Stream
01443435	Paulins Kill UNT at Rt 519	41.126359	-74.7487692	SUSSEX	Yes	River/Stream
01367750	Beaver Run at Rt 23 near Hamburg	41.18099	-74.590326	SUSSEX	Yes	River/Stream
01367950	Quarryville Bk at Lower Unionville Rd	41.234408	-74.5724814	SUSSEX	No	River/Stream

Station ID(WQDE compliant and referenced)	Waterbody/Location	Latitude-dd	Longitude-dd	County	Site exists in WQDE already?	Location Type
01462005	Swan Ck off off Swan St in Lambertville	40.364171	-74.9446149	HUNTERDON	Yes	River/Stream
BFBM000260	Big Flat Bk off Walplane Rd	41.219793	-74.779363	SUSSEX	No	River/Stream
01367902	Clove Bk at Rt 23	41.20785	-74.6092038	SUSSEX	Yes	River/Stream
01439960	Flat Bk At Main St (Wallpack Center)	41.157161	-74.8773675	SUSSEX	No	River/Stream
01443276	Paulins Kill UNT at Sunset Inn Rd (Rt 623)	41.066751	-74.6877918	SUSSEX	Yes	River/Stream
01443293	Paulins Kill UNT at Meadows Rd at Lafayette NJ	41.105736	-74.6823239	SUSSEX	Yes	River/Stream

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection	Habitat	Metrics	Indices
01455700	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01443468	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01444970	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01462200	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
AN0051	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01461262	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01463200	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01443462	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01463920	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01455099	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01443476	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01457930	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01458400	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01438517	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01367729	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01456590	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01443435	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01367750	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01367950	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01462005	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
BFBM000260	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01367902	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01439960	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01443276	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
01443293	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection
01455700	DEP	DEP	NJDOH	NO	NO	NO	NO
01443468	DEP	DEP	NJDOH	NO	NO	NO	NO
01444970	DEP	DEP	NJDOH	NO	NO	NO	NO
01462200	DEP	DEP	NJDOH	NO	NO	NO	NO
AN0051	DEP	DEP	NJDOH	NO	NO	NO	NO
01461262	DEP	DEP	NJDOH	NO	NO	NO	NO
01463200	DEP	DEP	NJDOH	NO	NO	NO	NO
01443462	DEP	DEP	NJDOH	NO	NO	NO	NO
01463920	DEP	DEP	NJDOH	NO	NO	NO	NO
01455099	DEP	DEP	NJDOH	NO	NO	NO	NO
01443476	DEP	DEP	NJDOH	NO	NO	NO	NO
01457930	DEP	DEP	NJDOH	NO	NO	NO	NO
01458400	DEP	DEP	NJDOH	NO	NO	NO	NO
01438517	DEP	DEP	NJDOH	NO	NO	NO	NO
01367729	DEP	DEP	NJDOH	NO	NO	NO	NO
01456590	DEP	DEP	NJDOH	NO	NO	NO	NO
01443435	DEP	DEP	NJDOH	NO	NO	NO	NO
01367750	DEP	DEP	NJDOH	NO	NO	NO	NO
01367950	DEP	DEP	NJDOH	NO	NO	NO	NO
01462005	DEP	DEP	NJDOH	NO	NO	NO	NO
BFBM000260	DEP	DEP	NJDOH	NO	NO	NO	NO
01367902	DEP	DEP	NJDOH	NO	NO	NO	NO
01439960	DEP	DEP	NJDOH	NO	NO	NO	NO
01443276	DEP	DEP	NJDOH	NO	NO	NO	NO
01443293	DEP	DEP	NJDOH	NO	NO	NO	NO

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

Analysis (lab name)	EPA Characteristic Name	Method Speciation Name	Result Sample Fraction	Result Measure Unit	Result Value Type	Sample Collection Type	Sample Collection Equipment
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Alkalinity, total	as CaCO3	Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Ammonia-nitrogen	as N	Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Calcium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Chloride		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Organic carbon		Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Organic carbon		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Hardness, carbonate		Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Chromium(VI)		Dissolved	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Magnesium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	as N	Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Phosphorus	as P	Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Phosphorus	as P	Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Potassium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Sodium		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Sulfate		Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Total dissolved solids		Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Kjeldahl nitrogen	as N	Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Kjeldahl nitrogen	as N	Dissolved	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Total suspended solids		Total	mg/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Aluminum		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)

Analysis (lab name)	EPA Characteristic Name	Method Speciation Name	Result Sample Fraction	Result Measure Unit	Result Value Type	Sample Collection Type	Sample Collection Equipment
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Arsenic		Total Recoverable	ng/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Cadmium		Total Recoverable	ng/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Chromium		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Copper		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Iron		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Lead		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Mercury		Total Recoverable	ng/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Nickel		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Selenium		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)
NEW JERSEY DEPARTMENT OF HEALTH - 11036	Zinc		Total Recoverable	ug/l	Actual	Grab	Water Sampler (Other)
							Water Sampler (Other)

Parameter	Laboratory	Method	Method ID Context	Lower Reporting Limit	units	Method Detection Limit	Holding Time	Preservative
Alkalinity	NEW JERSEY DEPARTMENT OF HEALTH - 11036	2320-B	APHA	1	mg/l	1	14 days	Ice to 4 deg C
Ammonia (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	4500-NH3(H)	APHA	0.05	mg/l	0.006	28 days	H2SO4 to ph < 2, Ice to 4 deg C
Calcium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	0.1	mg/l	0.007	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	0.113	28 days	Ice to 4 deg C
Organic Carbon (Total) (TOC)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	5310-C	APHA	0.5	mg/l	0.058	28 days	Ice to 4 deg C
Organic Carbon (Diss.) (DOC)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	5310-C	APHA	0.5	mg/l	0.058	28 days	Ice to 4 deg C
Hardness	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	0.662	mg/l	0.069	6 months	HNO3 to pH <2, Ice to 4 deg C
Chromium, Hexavalent (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	218.6	USEPA	0.1	ug/l	0.039	28 days	, 5mls ammoniumhydroxide/ammonium sulfateIce to 4 deg C
Magnesium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	0.1	mg/l	0.006	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	0.00487	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	0.00553	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	0.00553	28 days	H2SO4 to ph < 2, Ice to 4 deg C
Potassium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	0.1	mg/l	0.028	6 months	HNO3 to pH <2, Ice to 4 deg C
Sodium (Dissolved)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	0.1	mg/l	0.006	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	1.59	28 days	Ice to 4 deg C
Total Dissolved Solids	NEW JERSEY DEPARTMENT OF HEALTH - 11036	2540-C	APHA	1	mg/l	1	7 days	Ice to 4 deg C

Parameter	Laboratory	Method	Method ID Context	Lower Reporting Limit	units	Method Detection Limit	Holding Time	Preservative
Kjeldahl Nitrogen (Total) (TKN)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	351.2	USEPA	0.1	mg/l	0.046	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	0.046	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	28 days	Ice to 4 deg C
Aluminum	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	10	ug/l	1.4	6 months	HNO3 to pH <2, Ice to 4 deg C
Arsenic (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.8(W)	USEPA	10	ng/l	6	6 months	HNO3 to pH <2, Ice to 4 deg C
Cadmium (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.8(W)	USEPA	10	ng/l	1.7	6 months	HNO3 to pH <2, Ice to 4 deg C
Chromium (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.7(W)	USEPA	2	ug/l	0.238	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	0.01	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	0.94	6 months	HNO3 to pH <2, Ice to 4 deg C
Lead (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.8	USEPA	1	ug/l	0.16	6 months	HNO3 to pH <2, Ice to 4 deg C
Mercury (Total Rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	1631	USEPA	0.5	ng/l	0.2	90 days	BrCl, Ice to 4 deg C
Nickel (Total rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.8(W)	USEPA	0.5	ug/l	0.01	6 months	HNO3 to pH <2, Ice to 4 deg C
Selenium (Total rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.8	USEPA	1	ug/l	0.2	6 months	HNO3 to pH <2, Ice to 4 deg C
Zinc (Total rec.)	NEW JERSEY DEPARTMENT OF HEALTH - 11036	200.8(W)	USEPA	5	ug/l	0.2	6 months	HNO3 to pH <2, Ice to 4 deg C

Attachment B: Standard Operating Procedures for Making Discharge Measurements in Wadeable, Non-tidal Freshwater Streams with a Handheld Acoustic Doppler Velocimeter

Bureau of Freshwater and Biological Monitoring Standard Operating Procedure for Making Discharge Measurements in Wadable, Non-tidal, Freshwater Streams with a Handheld Acoustic Doppler Velocimeter (ADV)

With additional guidance from the United States Geological Survey, the New Jersey Department of Environmental Protection Bureau of Fresh Water and Biological Monitoring (NJ DEP/BFBM) adopted the Standard Operating Procedures from the manufacturer for using a handheld ADV and the United States Geological Survey Field manual.

Field Manual for United States Geological Survey:
http://training.usgs.gov/TEL/Nolan/SWProcedures/Index.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 - In order 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. For the purpose of uniformity, the left edge of water 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 ISO/USGS procedures) along a transect. By combining this information, the total discharge can be calculated.

A. Preparation

1. 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 measure at a distance of 4 inches from the probe face. 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.

2. 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).
3. 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.
4. During the entire measurement, the probe’s X-axis must be maintained perpendicular to the tag line. 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.

B. Starting the discharge measurement

1. Turn the handheld ADV on. Press ENTER to display the Main Menu.
2. Press 1 to enter the Setup Parameters Menu. Sampling Volume YX Probe Coordinate System Graduated Tag Line Primary Flow Direction Mounting Pin
3 At the Setup Parameters Menu, review the current settings and change the values to meet the requirements. To change a displayed value, press the number next to the relevant parameter.
4. Press ENTER to display more menu options. For example:
5. Press 2 in the Setup Parameters Menu to change the Averaging Time.
   The defaults for these parameters are: Units: English Averaging Time: 40 seconds Mode: Discharge Salinity: 0.0 ppt
   (freshwater) Discharge Equation: Mid Section When you are finished,
6. Press 0 to return to the Main Menu.
7. Now press 2 to enter the System Functions Menu.

C. Field-testing the hand held ADV

1. Collect and verify temperature data (press 4).
2. Check battery voltage (press 5). If voltage is at 60% or below, then a battery change is required before proceeding.
3. Collect and verify raw data. Ideally, SNR (signal noise ratio) values should be >10 dB, but 4 dB is acceptable (press 6).
4. Verify the internal clock is correct (press 9).
5. When you are done, press 0 to return to the Main Menu.

D. Enter site information

1. Press 3 to Start Data Run and display the Data File Name Menu.
2. Press 1 and enter a file name. To enter text names, use the same method as mobile phones (e.g., press 2 four times for "C"; 2–A–B–C). Now press 9 to accept the name. At any time during data collection,
3. Press 8 (QC Menu) to enter supplemental data including gauge height, rated flow, and user comments.

E. Collect station data

1. In the Starting Edge screen, enter the location, depth, correction factor, and starting edge using the marked buttons on the keypad. Note that LEW/REW stands for Left/Right Edge Water.
2. Press Next Station to continue. Enter the location, depth, and method of measuring velocity (changed by pressing Method +/-).
3. When the station information is complete, and the probe is at the correct depth and Orientation, press the Measure button. An updating display will show the measured velocity and SNR values. Keep the probe as steady as possible.
4. On completion of the averaging time, a summary will be displayed. Press 1 to accept and go to the next station or depth, or
5. Press 2 to repeat this measurement. These steps will be repeated for all stations until End Section is pressed.

F. Ending the measurement

1. When End Section is pressed, the ending-edge information is displayed. Enter the information for this edge. The Previous Station and Next Station buttons can also be pressed to review completed stations.
2. Press Calc Discharge to compute the total cross-sectional discharge for all completed stations.
3. Press 0 to return to the Main Menu.

You must always return to the Main Menu to make sure that all data is saved.

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 on a daily basis. These tests ensure that the meter and probe are operating within the manufacturers guidelines. If either of these tests are failed, a discharge measurement will not be made with that particular meter 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 qualified for performing discharge measurements will be required to have a flow comparison check against the ADR at the Pequannock River(USGS# 01382500) a USGS real time gage reading quarterly during their assigned visit. 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.
All discharge measurements made that are placed into records should have the flow rate (cubic feet per second) and also be designated a rank which determines the quality of measurement.

NJDEP/BFBM rank the quality of stream flow measurements by summing the International Organization of Standardization and Statistical uncertainty levels located on the data file (.WAD).

Rank:	**</= 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 for viewing.

All projects and staff using the handheld ADV should adhere to the Standard Operating Procedures listed.

Attachment C: NJDOH Standard Operating Procedures

Program: Inorganic Chemistry

Lab Method Number	Lab Method Revision Number	Reference Method	SOP Description	Date
ECLS-I-CVAS-1	0	EPA 1631E	Mercury	10/26/15
ECLS-I-ICP-1	9	EPA 200.7	Aluminum, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Barium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Beryllium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Boron, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Cadmium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Calcium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Chromium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Cobalt, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Copper, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Hardness (Calcium)	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Hardness (Total)	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Iron, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Magnesium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Manganese, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Nickel, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Potassium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Sodium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Strontium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Tin, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Zinc, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Molybdenum, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Silica, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Silver, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Titanium, ICP	12/10/13
ECLS-I-ICP-1	9	EPA 200.7	Vanadium, ICP	12/10/13
ECLS-I-ICPMS-1	9	EPA 200.8	Aluminum, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Antimony, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Arsenic, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Barium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Beryllium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Cadmium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Chromium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Copper, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Lead, ICPMS (WS)	4/3/17

ECLS-I-ICPMS-1	9	EPA 200.8	Manganese, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Nickel, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Thallium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Zinc, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Mercury, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Molybdenum, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Selenium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Uranium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Uranium, Radiation	4/3/17
ECLS-I-ICPMS-1	9	EPA 200.8	Vanadium, ICPMS (WS)	4/3/17
ECLS-I-ICPMS-2	3	EPA 200.8	Aluminum, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Antimony, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Arsenic, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Barium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Beryllium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Cadmium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Chromium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Copper, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Lead, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Manganese, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Nickel, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Thallium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Zinc, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Molybdenum, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Selenium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Uranium, ICPMS (WP)	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Uranium, Radiation	11/18/14
ECLS-I-ICPMS-2	3	EPA 200.8	Vanadium, ICPMS (WS)	11/18/14
ECLS-I-ICPMS-3	0	EPA 200.8	Arsenic, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Cadmium, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Chromium, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Copper, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Iron, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Lead, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Nickel, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Mercury, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Zinc, ICPMS (Food)	2/15/17
ECLS-I-ICPMS-3	0	EPA 200.8	Selenium, ICPMS (Food)	2/15/17
ECLS-I-GFAA-1	10	EPA 200.9	Antimony, GFAAS	12/10/13
ECLS-I-GFAA-1	10	EPA 200.9	Arsenic, GFAAS	12/10/13
ECLS-I-GFAA-1	10	EPA 200.9	Lead, GFAAS	12/10/13
ECLS-I-GFAA-1	10	EPA 200.9	Thallium, GFAAS	12/10/13

ECLS-I-GFAA-1	10	EPA 200.9	Selenium, GFAAS	12/10/13
ECLS-I-CVAA-2	4	EPA 245.1	Mercury, EPA 245.1	4/15/16
ECLS-I-ION-4	12	EPA 300.0	Bromide by Ion Chromatography	5/1/17
ECLS-I-ION-4	12	EPA 300.0	Chloride by Ion Chromatography	5/1/17
ECLS-I-ION-4	12	EPA 300.0	Fluoride by Ion Chromatography	5/1/17
ECLS-I-ION-4	12	EPA 300.0	Sulfate by Ion Chromatography	5/1/17
ECLS-I-FIA-6	9	EPA 335.4	Cyanide, Total	8/14/15
ECLS-I-FIA-5	8	EPA 351.2	Nitrogen, Total Kjeldahl (Dissolved)	6/5/17
ECLS-I-FIA-5	8	EPA 351.2	Nitrogen, Total Kjeldahl (Total)	6/5/17
ECLS-I-VIS-6	15	EPA 420.1	Phenols	5/25/17
ECLS-I-GEN-3	10	SM 2120 B	Color	12/5/13
ECLS-I-GEN-1	12	SM 2130B	Turbidity	4/27/15
ECLS-I-GEN-4	9	SM 2150B	Odor	9/11/13
ECLS-I-ALK-1	6	SM 2320B	Alkalinity	3/26/15
ECLS-I-GEN-2	14	SM 2510B	Conductivity	8/15/16
ECLS-I-GRAV-3	12	SM 2540B	Solids, Total (TS)	5/25/17
ECLS-I-GRAV-1	13	SM 2540C	Solids, Total Dissolved (TDS)	3/13/17
ECLS-I-GRAV-2	12	SM 2540D	Solids, Total Suspended (TSS)	5/25/17
ECLS-I-GRAV-4	1	SM 2540E	Solids, Total Volatile (TVS)	5/25/17
ECLS-I-SS-1	5	SM 2540F	Solids, Settleable	5/19/17
ECLS-I-VIS-4	13	SM 3500-Cr B	Chromium, Hexavalent	2/7/14
ECLS-I-ISE-1	13	SM 4500-F C	Fluoride by ISE	3/27/15
ECLS-I-PH-1	5	SM 4500H-B	pH	10/7/14
ECLS-I-FIA-3	10	SM 4500-NH3 H	Nitrogen, Ammonia - Distilled (Dissolved)	6/1/17
ECLS-I-FIA-3	10	SM 4500-NH3 H	Nitrogen, Ammonia - Distilled (Total)	6/1/17
ECLS-I-FIA-2	10	SM 4500-NH3 H	Nitrogen, Ammonia - Undistilled (Dissolved)	6/1/17
ECLS-I-FIA-2	10	SM 4500-NH3 H	Nitrogen, Ammonia - Undistilled (Total)	6/1/17
ECLS-I-FIA-1	10	SM 4500-NO3 F	Nitrogen, Nitrite (Total)	3/25/15
ECLS-I-FIA-1	10	SM 4500-NO3 F	Nitrogen, Nitrite (Dissolved)	3/25/15
ECLS-I-FIA-1	10	SM 4500-NO3 F	Nitrogen, Nitrite + Nitrate (Dissolved)	3/25/15
ECLS-I-FIA-1	10	SM 4500-NO3 F	Nitrogen, Nitrite + Nitrate (Total)	3/25/15
ECLS-I-O-1	6	SM 4500-O C	Dissolved Oxygen	6/5/17
ECLS-I-FIA-7	10	EPA 365.1	Phosphorus, Ortho (Dissolved)	3/27/15
ECLS-I-FIA-7	10	EPA 365.1	Phosphorus, Ortho (Total)	3/27/15
ECLS-I-OD-1	10	SM 5210B	CBOD	6/1/17
ECLS-I-OD-1	10	SM 5210B	BOD	6/1/17

ECLS-I-VIS-8	15	SM 5220 D	COD - Low Level	6/1/17
ECLS-I-VIS-1	17	SM 5220 D	COD - Standard	6/1/17
ECLS-I-TOC-2	8	SM 5310 C	Organic Carbon (Dissolved)	7/26/16
ECLS-I-TOC-2	8	SM 5310 C	Organic Carbon (Total)	7/26/16
ECLS-I-VIS-2	15	SM 5540 C	MBAS	4/20/15
ECLS-I-FIA-10	7	SM4500-Cl E	Chloride	6/1/17
ECLS-I-FIA-11	7	EPA 365.1	Total Phosphorous	6/1/17
ECLS-I-FIA-12	2	EPA 375.2	Sulfate	4/27/15
ECLS-I-ION-CR6	2	EPA 218.6	Chromium, Hexavalent	4/8/16
ECLS-I-OD-2	0	ECLS-I-OD-2	BOD, Ultimate	6/1/17
ECLS-I-ICPMS-BM	0	DLS 3016.8-03	Cadmium	12/12/16
ECLS-I-ICPMS-BM	0	DLS 3016.8-03	Lead	12/12/16
ECLS-I-ICPMS-BM	0	DLS 3016.8-03	Mercury	12/12/16
ECLS-I-ICPMS-BM	0	DLS 3016.8-03	Selenium	12/12/16
ECLS-I-ICPMS-BM	0	DLS 3016.8-03	Manganese	12/12/16
ECLS-I-ICPMS-U	1	DLS 3018A.3-02	Arsenic	5/25/17
ECLS-I-ICPMS-U	1	DLS 3018.4-02	Barium	5/25/17
ECLS-I-ICPMS-U	1	DLS 3018.4-02	Beryllium	5/25/17
ECLS-I-ICPMS-U	1	DLS 3018.4-02	Cadmium	5/25/17
ECLS-I-ICPMS-U	1	DLS 3018.4-02	Lead	5/25/17
ECLS-I-ICPMS-U	1	DLS 3018.4-02	Thallium	5/25/17
ECLS-I-ICPMS-U	1	DLS 3018.4-02	Uranium	5/25/17