QUALITY ASSURANCE PROJECT PLAN

for

Rapid Stream Assessment Program

Government of the District of Columbia
Department of Energy and Environment
Natural Resources Administration
Water Quality Division

1200 First St NE, 5th Floor
Washington, DC 20002

Date of Preparation: May 2024
Date of Expiration: December 19, 2028

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EPA Delegated Approving Official (DAO)

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DOEE	Department of Energy and Environment
DQO	Data Quality Objective
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
MBSS	Maryland Biological Stream Survey
MS4	Municipal Separate Storm Sewer System
NRA	Natural Resources Administration
NPDES	National Pollutant Discharge Elimination System
PRB	Planning and Reporting Branch
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RSA	Rapid Stream Assessment
SOP	Standard Operating Procedure
WPD	Watershed Protection Division
WQD	Water Quality Division

PREFACE

This Quality Assurance Project Plan is a component of a comprehensive Quality Assurance (QA)/Quality Control (QC) Program for Rapid Stream Assessments that also includes:

- Field Data Collection Guide for Rapid Stream Assessments (Appendix 1)
- RSA Activities and Protocols for Quality Assurance & Quality Control (QA/QC) (Appendix 2)
- Standard Operating Procedures for using RSA Data Collection Tools (Appendix 3)

The Rapid Stream Assessment (RSA) Program that is covered in this document is implemented primarily by staff of the Natural Resources Administration and their Municipal Separate Storm Sewer System (MS4) contractor support.

GROUP A: PROJECT MANAGEMENT

A.1. Distribution List

This document has been directly distributed to, and approved by, the following list of individuals and organizations.

- Elizabeth Ottinger, EPA Project Manager
- Richard Jackson, DOEE Director and Quality Assurance Officer
- Jonathan Champion, Associate Director, DOEE Water Quality Division
- Matt Gallagher, RSA Quality Assurance Supervisor, DOEE Water Quality Division
- Alicia Ritzenthaler, Rapid Stream Assessment Program Lead, DOEE

Other key team members and support staff involved in the RSA Program are also provided this document.

A2. Project Organization

The purpose of this document is to present the Quality Assurance Project Plan (QAPP) for the Rapid Stream Assessment (RSA) Program. The RSA Program has been developed to support the District Department of Energy and the Environment's (DOEE's) Municipal Separate Storm Sewer System (MS4) Program as well as to collect data to be used by other teams within the Natural Resource Administration (e.g. Wetlands, Watershed Protection Division) and by external stakeholders (e.g. DC Water). Data collected as part of the RSA Program is also used by DOEE in public outreach/educations tools (i.e. Stream Condition Index).

This QAPP provides general descriptions of the work to be performed to collect and analyze the data, the procedures used to ensure the data are scientifically valid and defensible, and how uncertainty has been reduced to a known and practical minimum. Key project roles are filled by those responsible for ensuring the collection of valid data and the routine assessment of these data.

The project organizational chart is presented in Figure 1. It reflects the relationships and the lines of communication among key RSA participants and data users.

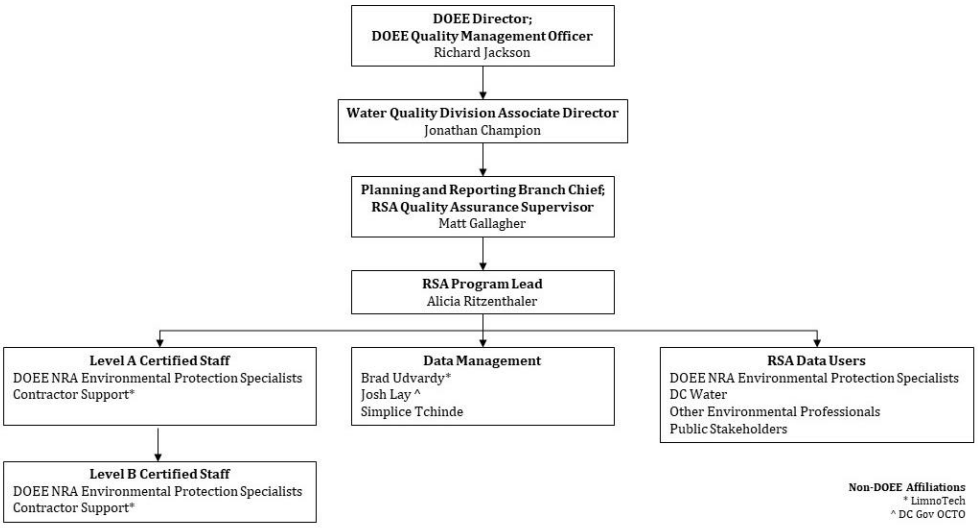

Figure 1. Current key personnel and their corresponding responsibilities for the Rapid Stream Assessment Program.

The RSA Quality Assurance Supervisor is a member of the DOEE management team and has leadership authority over the RSA program. The primary RSA responsibilities of the RSA Quality Assurance Supervisor, who serves as the independent Quality Assurance Manger, include the following:

- Providing support to the RSA Program Lead in the preparation and distribution of the QAPP.
- Reviewing, assessing the effectiveness of, and approving the QAPP

- Ensuring QA/QC is maintained throughout the assessment program in the field and subsequent analysis
- Discussing any corrective actions or other quality issues with the RSA Program Lead and any relevant staff as applicable, e.g. Recommending appropriate QA/QC remedial and/or corrective actions when needed
- Providing guidance and technical advice to RSA program staff
- Facilitating RSA collaborations (i.e. staffing, data sharing) outside the Water Quality Division's Planning and Reporting Branch as appropriate

The primary responsibilities of the RSA Program Lead include the following:

- Preparing, maintaining, and distributing the QAPP
- Develop training materials for RSA participants that adequately provide the resources necessary to conduct assessments in line with QAQC requirements
- Scheduling and coordinating annual QAQC activities
- Monitoring QAQC activities, including field audits, to determine QAQC protocols are maintained throughout the assessment program in the field and subsequent analysis
- Track staff participation in training and QAQC activities to ensure compliance with QAQC protocols
- Provide written documentation of QC reviews documenting if/when the standards set forth in the QAQC protocols and/or QAPP are not met
- Implementing remedial and/or corrective actions as recommended by the RSA QA Officer
- Scheduling field staff and assigning streams to be assessed
- Maintaining RSA dashboards (i.e. internal and public) and responding to RSA-related data inquiries
- Overseeing data management support team to ensure data management is being maintained as described in the QAPP

The primary responsibilities of the Level A certified staff include the following:

- Conducting rapid stream assessments in accordance with project SOPs and QAPP
- Conducting annual training and field staff audits
- Reporting any potential QAQC and/or field safety issues encountered throughout the assessment program to RSA Program Lead
- Contributing to programmatic review and improvement as requested by the RSA Program Lead
- Conducting equipment/device operation check and logging device performance issues

The primary responsibilities of the Data Management Support Team includes the following:

- Maintaining the Rapid Stream Assessment database
- Ensuring data is routinely backed up
- Assisting RSA Program Lead and QA Officer to review data and ensure completeness
- Providing technical assistance to RSA Program staff related to data inquiries and analysis

Other QA/QC Staff, such as technical reviewers and technical editors selected as needed, will provide peer review oversight on the content of work products and ensure that work products comply with DOEE specifications.

A3. Problem Definition/Background

The Department of Energy and Environment's Natural Resources Administration (NRA) (herein after referred to as "DOEE") implements water quality and related monitoring in the District's waterbodies. The RSA Program was developed to address specific monitoring requirements stipulated in the District's Phase 1 Municipal Separate Stormwater System (MS4) Permit.

The RSA Program seeks to address several goals and objectives driven by the MS4 permit including:

Goals:

- Provide data and basic information on the health and integrity of the District's waters and related aquatic ecosystems.
- Accurately characterize the quality of the District's waterbodies, and more clearly set expectations for their protection, use and enjoyment.

Objectives:

- Evaluate the health of the receiving waters to include the identification of stressors and their ecological effects
- Assess trends to evaluate progress toward meeting water quality standards
- Determine status and trends of MS4 impacts in receiving waters through effective monitoring (MS4 permit)
- Provide adequate quantity and quality of data to assess, analyze, and evaluate status of DC waterbodies.

The overarching purpose of the RSA Program is three-fold:

- To develop a complete inventory of the District's streams and the characteristics associated with these streams
- To develop a baseline from which to compare changes or trends over time, and
- To identify issues that need to be investigated further and addressed (i.e., potential restoration projects, dump sites, illicit connections, severe stream erosion).

A4. Project Description

The full length of all perennial, safely wadeable, and accessible stream reaches within the District, including Rock Creek, will be assessed during the stream walks in the Rapid Stream Assessment.

The RSA includes several types of assessments including:

- Reach assessments
    - Open channel (above-ground) streams;
    - Closed channel (piped) streams
- Point assessments

The RSA will include general stream characterization, habitat evaluation, and evaluation of geomorphological features. In addition, infrastructure along each stream reach (i.e., stormwater outfalls, exposed sewer pipes, illicit discharges) and human impacts to the environment (i.e., dump sites, stream buffer deficiencies), will be identified and recorded (if not already documented by the District).

Hand-held, GPS enabled devices, will be used during RSA to facilitate rapid and accurate data collection. Examples of these electronic data collection field forms, and tutorials for using them, are included in the associated SOP (Appendix 3).

All accessible stream reaches, and corresponding point features, will be assessed within every five-year permit cycle.

A5. Data Quality Objectives and Measurement Performance Criteria

Data quality objectives (DQO's) are qualitative and quantitative statements that clarify the intended use of the data, define the type of data needed to support the decision, identify the conditions under which the data should be collected, and specify tolerable limits on the probability of making a decision error due to uncertainty in the data (if applicable). DQOs are developed by data users to specify the data quality needed to support specific decisions. DQOs are also used as an indicator of potential method problems. However, if issues are identified, data are not always discarded simply because DQOs are not met. Instead, this is a signal to further investigate and correct problems. Once the problem(s) are rectified, the data can still be utilized, as long as the correction is satisfactory.

The quality of an environmental monitoring program can be evaluated in three steps: (1) establishing scientific assessment quality objectives, (2) evaluating program design for whether the objectives can be met, and (3) establishing assessment and measurement quality objectives that can be used to evaluate the appropriateness of the methods being used in a program. The process of establishing DQOs involves identifying the allowable uncertainty of a dataset which may lead to two types of error: false positives (Type I error: a difference is found to exist when in fact it does not) and false negatives (Type II error: a difference is not found when in fact it does exist).

The acceptance probabilities of those errors as established by the data users are the DQOs. The DQO process entails establishing action-triggering values and selecting rates of false positives and

false negatives that are acceptable to the data user (decision maker). The quality of a particular dataset is some measure of the types and amount of error associated with the data.

Sources of error or uncertainty associated with variables and indicators include the following:

- Sampling (or random) error: The difference between sample values and in situ "true" values from unknown biases due to sampling design. Sampling error includes natural variability (spatial heterogeneity and temporal variability in population abundance and distribution) not specifically accounted for in a design (for design-based inference), and variability associated with model parameters or incorrect model specification (for model-based inference).
- Measurement (or systematic) error: The difference between sample values and in situ "true" values associated with the measurement process. Measurement error includes bias and imprecision associated with sampling methodology, specification of the sampling unit, identification, instrumentation, etc.

The data requirements for the RSA encompass aspects of field data collection, data analysis, and database management to reduce sources of errors and uncertainty in the use of the data. Methods and procedures described in this document (and appendices) are intended to reduce the magnitude of measurement error sources and frequency of occurrence. Project quality objectives include the following:

- Use of standardized, repeatable field assessment procedures
- Use of trained staff to perform the field assessment
- Evaluation of duplicate field team assessments of the same reaches to assess consistency
- Review of collected data

Data generated under this QAPP are used, in part, to meet requirements of the Districts MS4 permit. Therefore, it is of utmost importance that the data are of sufficient quality to meet this need.

To ensure the collection of high-quality data, specific DQOs have been set for field data collection procedures on a method basis for precision, accuracy, representativeness, comparability and completeness.

Precision

Precision is a measure of the degree to which two or more measurements of the same sample are in agreement as well as a measurement of random error. The level of precision which is acceptable is specific to individual metrics and has been determined based upon inherent variation expected (Appendices 2).

Repeat assessments at quality control sites will provide data with which to compare values. Inconsistent values across multiple measurements will result in investigation of the reason for inconsistencies and the need for any corrective action (i.e. training). For more details, refer to the 'Field Verification' section of Appendix 2.

Accuracy

Accuracy is an evaluation of the degree to which a measured value and a known reference value or true value are in agreement. This is a measurement of systematic error and is often referred to as "bias". Accuracy is determined by the analysis of reference material and comparison of the resulting value to that of the accepted value. The difference between the accepted and reference value is the percent difference.

Field data will be collected in a manner in which the metrics were designed (i.e., according to protocol, Appendix 1). For this reason, DOEE provides RSA training for all field staff. Additionally, a staff certification program is used to ensure that they retain necessary knowledge and properly complete their RSAs (Appendix 2). The level of accuracy, which is required to pass staff certification and the level of accuracy deemed acceptable for individual metrics, has been determined based upon inherent variation evaluated in year one of the RSA and is discussed further in Appendix 2 (RSA Activities and Protocols for Quality Assurance & Quality Control).

Because data are entered directly into the FieldMaps/Survey123 application tool, any transcription errors that may impact accuracy are not an issue. Additionally, geodatabase domains and the FieldMaps/Survey123 tool's conditionally programmed restrictions ensure that only appropriate data may be entered associated with a particular metric or data entry point.

Representativeness

Representativeness is the determination of how representative a sample is of the population. Representativeness of the sampling approach for the RSA is inherent in its design as this program evaluates the entire wadeable stream network within the District.

Comparability

Comparability is a measure of how comparable proposed methods are to accepted methods. Two datasets are considered comparable when there is confidence that they are equivalent with respect to the measurement of a specific variable or group of variables. For this project, data will be considered comparable if they meet the performance criteria, or DQOs, for each step of the sampling process. Measurement data collected in this project will follow procedures adapted from MBSS and documented in the RSA SOP. Comparability is dependent on the proper design of the sampling program, and on adherence to sampling techniques and SOPs.

Comparability in field data will also be maintained through the audit program by ensuring staff complete RSA in a consistent manner. Regular mixing of field staff teams also supports ongoing promotion of comparability.

Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount that was expected to be obtained under normal conditions. Geographic completeness is considered to be assessment of greater than 90% of all safely wadeable streams in the District. Data completeness of each stream assessment is expected to be 100%. Use of the FieldMaps/Survey 123 data collection tool requires that all applicable data, based on survey type, is collected before an assessment is submitted. If any required data is missing, this data collection tool prompts staff to complete the missing information before allowing submission.

A6. Special Training/Certification

All DOEE personnel and contractors participating in the rapid stream assessment program are environmental protection specialists with the relevant education and experience needed to carry out the field sampling and analysis programs. In addition, all staff participating in the RSA program shall be certified to conduct these assessments. Certification level will be based upon completed training, audits, and the number of assessment hours completed. All staff will attend an annual training focused on the procedures for RSA and for scoring the metrics described in the field manual. To maintain their certification, all staff will be audited every 2-3 years based upon their certification level to ensure that all staff are able to demonstrate proper application of knowledge and skills necessary for conducting RSAs (Appendix 2). It is the responsibility of the RSA Program Lead to track staff participation in QAQC activities including training and certification.

A7. Documents and Records

Thorough documentation of all field activities is necessary for proper interpretation of study results. The RSA Program Lead will ensure that all current programmatic documentation, including this QAPP is saved on the DOEE shared network drive. They will also ensure that all RSA staff know where to find this documentation and have access to it.

RSA data will be preserved in the program's Enterprise Geodatabase. The servers which RSA

Enterprise Geodatabase is saved are maintained and routinely back-up according to DOEE Information Technology (IT) and DC Government Office of the Chief Technology Officer (OCTO) protocols. Per the DOEE data retention schedule, all RSA data will be retained for at least 10 years beyond the conclusion of the RSA Program (i.e. 5 years at DOEE offices + additional 5 years retained in records).

To facilitate accurate documentation, field crews will be using mobile devices to record field observations. Mobile devices will also use a built-in camera to capture photographs of features within the tributaries including various point assessments (e.g., erosion points, buffer deficiencies, dump sites) and the overall character of a reach.

Observations made at the watershed scale will be recorded as an attribute to the watershed reference layer. These notes can be added in real-time by field staff using mobile devices or on a desktop computer in the office after an entire watershed has been assessed.

The District makes every effort to have reporting information readily available to the public and state and federal agencies. RSA data is made available in real-time via a publicly accessible online data dashboard. DOEE will also submit progress towards the RSA targets in the MS4 Annual Report and MS4 Annual Report StoryMap each year. All RSA data, reporting, and documentations are linked from the DOEE website.

Additionally, any issues that are identified during field assessments which may warrant remediation and/or immediate follow-up, such as dump sites or exposed utility lines, will be reported to the appropriate point of contact within a timeframe that is appropriate relative to the issue identify (Appendix 1).

GROUP B: DATA GENERATION AND ACQUISITION ELEMENTS

B1. Sampling Process Design

The intent of the RSA is to collect data that provides a high-level overview of the entire wadeable (and accessible) stream network within the District. To accomplish this, the program was designed such that all wadeable first through fourth order streams would be evaluated. Additionally, temporary reaches will also be evaluated, as feasible, in an effort to establish a baseline for the District's stream network.

It is not anticipated that significant changes will occur within the stream network on a frequent basis, so the RSA has been designed with the intent that approx. 20% of stream miles will be assessed each year such that the entire networked will be assessed each MS4 permit cycle (once every five years).

The following will be assessed through the RSA:

- Open channel stream reaches
- Closed-channel stream reaches, i.e. a piped section of stream which has at least one open channel segment both up and downstream
- Point assessment; distinct or discrete features not characteristic of the stream reach where the point is found.

Reach Assessments

Reach assessments are performed in association with both open-channel streams as well closed-channel (e.g., piped) streams.

For each stream reach, the following will be collected:

- Basic data, including names of field staff and date of assessment,
- A broad range of metrics describing the physical habitat, geomorphology, and urbanization of the reach
- Representative photos
- Optional comments describing features of the reach that may not be fully captured in assessment questions

The metrics evaluated for reaches include: water presence, water flow, water clarity, odor (from water or sediment), maximum depth encountered, average depth, maximum width, fish presence, aquatic vegetation, algae, bacteria presence, trash, dominant riparian vegetation, riparian vegetation width, substrate type, shading, bank erosion, woody debris and root wads, recreation evidence, floodplain connectivity, and approximate Rosgen classification.

Point Assessments

Points are considered locations within a stream reach where a distinct or discrete feature is identified. Point assessments will be recorded for:

- Deficient buffers: location and length of deficiency, type of cover in deficient buffer area, and impact score
- Crossings (of bridges, roads, etc.): type, diameter/width, length, and material of crossing; presence of debris, bed erosion, sediment deposition, and impact score
- Dumpsites: bank where the dumpsite is located, location of the dumpsite (bank, floodplain, etc.), cleanup potential, dumped material, trash volume, and impact score
- Erosion: erosion location, severity, and impact score
- Outfalls: location, diameter, and type of pipe material; deposits/stains, floating solids/trash, erosion due to the outfall pipe, and impact score
    - If there is a discharge from the pipe, additional metrics evaluated include: discharge type, quality of discharge, discharge odor, discharge clarity
- Utility lines: utility line type, line diameter, material, condition, and impact score
- Non-piped blockage to fish passage: blockages to fish passage are located where there is a greater than a 0.3 meter (approximately one foot) change in stream bed elevation.
- Inaccessible Reach: reaches that are not accessible to survey teams due to fences or other limitations, but are still recognized as present.

"Other impacts" are also recorded as needed. These include issues like erosion and sediment control violations; anything unsafe, such as sudden drops from an outfall, or a partially collapsed outfall.

B2. Sampling Methods

The protocols used for this project are detailed in the Field Data Collection Guide for Rapid Stream Assessment and the SOP for Rapid Stream Assessment Data Collection (Appendix 1 and 3 respectively). Specific details on use of the use of the FieldMaps/Survey123 apps are included in the SOP. Prior to each round of sampling the Field Manual and SOP will be reviewed and updated to reflect any non-material changes made by the RSA Program Lead and/or the QA Officer (note: EPA approval should be sought in regards to material changes which affect the scope or objective of the program.

The RSA approach is visual-based and consists of evaluating a series of metrics along stream reaches as well as select points along the reach. Both perennial and temporary streams are evaluated through the RSA. Reach assessments are performed on 300-meter segments unless a change in stream character occurs first, which will trigger the beginning of a new stream reach. Changes in character may be the result of:

- Changes in flow or water quality characteristics (e.g., clarity, odor)
- Changes in stream geomorphology (e.g., floodplain connectivity, approximate Rosgen classification)
- Changes of in-stream physical habitat (e.g., substrate type, erosion, riparian area)

Data collection will occur from downstream to upstream. The right and left banks will then be oriented as such while looking upstream.

Within each stream reach, particular points of interest may be identified that are distinct from the overall stream character (e.g., buffer deficiency that is visually distinct from the surrounding riparian area). These points will be assessed in the order which they are found as the field team walks the 300-meter stream reach (the reach may be shorter if it is determined the character of the reach has changed before this). These Point assessments will be evaluated before the assessment for that Reach is completed.

All data will be collected within the FieldMaps/Survey123 app and saved to the program's geodatabase via ArcGIS online (AGOL). The RSA geodatabase is hosted on DC gov server which is administered by DOEE Information Technology (IT) and DC Gov Office of the Chief Technology Officer (OCTO). The RSA data management team, comprised of DOEE, OCTO, and contractor support, are responsible for geodatabase and server maintenance and routine back-ups.

Assessments will not occur on a tributary if there is no access to a site (e.g., the site is fenced off, the property owners have expressly restricted site access), if there are dangerous conditions, or if the reach is part of the mainstem. Assessment will take place between bud-out and leaf drop, approximately April 1 and October 31.

B3. Sample Handling and Custody

The RSA does not require any sample handling nor chain of custody.

B4. Analytical Methods

There are no analytical methods required in the RSA program.

B5. Quality Control

Data quality is addressed through consistent performance of procedures documented in the SOP and Field Guide (Appendices 3, 1). It is enhanced by the training and experience of project staff and documentation of project activities (Appendix 2). All RSA staff will receive both field and office training. The field training will include multiple teams conducting practice evaluations of the same stream reach so that results can be compared for consistency, and it may be determined that additional training is necessary. Office training will include metric scoring and the use of RSA dashboard/desktop interface.

This QAPP and other supporting materials will be distributed to all project personnel. Annual training sessions will be held in the spring prior to commencement of sampling. The RSA Program Lead will ensure that field assessments are done according to the established protocols and that all RSA-related forms are completed correctly during the stream assessment. Staff performance will be reviewed during the sampling and analysis phases to ensure adherence to project protocols (Appendix 2).

B6. Instrument/Equipment Testing, Inspection, and Maintenance

Internal quality control also includes protocols for insuring proper equipment performance. These quality assurance procedures are accomplished through the use of operation checks of field tablets at specific periodic intervals.

Level A certified staff should verify the proper operation of field devices prior to beginning assessments each day of scheduled field work. If the device does not turn on properly, does not have sufficient battery life, or if either the FieldMaps or Survey 123 applications cannot be log into, the issue should be logged and that device shall not be used for RSA until the issue has been resolved. If a device exhibits performance issues in the field (i.e. apps closing out, camera not focusing) the issue should be reported to the RSA Program Lead and that device not used until the performance problem has been resolved. It is the responsibility of Level A certified staff, with the support of the RSA Program Lead and QA Officer, to ensure reported problems are resolved and that a properly operating and performing device is used at the time of their assessments.

B7. Instrument/Equipment Calibration and Frequency

Field equipment will be checked each day assessments take place. See section B6, above.

B8. Inspection/Acceptance of Supplies and Consumables

Monitoring equipment (e.g., phones, tablets) are ordered from various manufacturers and are inspected upon arrival by DOEE personnel (i.e. DOEE IT, RSA staff). Broken or malfunctioning equipment is shipped back to the manufacturer for replacement.

B9. Non-Direct Measurements

Data obtained from existing data sources (i.e. not directly measured or generated in this project) may be used as ancillary reference to support RSA activities. Examples of these datasets may include:

- National Hydrology Dataset (i.e. stream centerlines)
- Infrastructure Features (e.g. outfalls, sewer lines, bridges)
- Wetlands Inventory
- Property Ownership

Data for ancillary reference use are obtained from geographic information system (GIS) databases created and maintained by the relevant authoritative agency (e.g. DOEE, DC Water, Office of the Chief Technology Officer (OCTO)). Each data source authority maintains responsibility for establishing, and adhering to, quality control measures to the datasets within their library.

The RSA Program Lead and RSA data management personnel are responsible for reviewing data/data sources to ensure their appropriateness for RSA activities. Data is deemed acceptable when it has been determined ‘authoritative’ by its data source. Data which has been ‘depreciated’ or is considered ‘preliminary’ by its respective data source can be used to support RSA activities only when no ‘authoritative’ dataset is available.

B10. Data Management

For the RSA, DOEE will collect data using the FieldMaps/Survey123 app. Level A certified staff will check the Survey123 app at the end of each sampling day to ensure all surveys have been successfully submitted. Once submitted in the app, data is saved to the RSA Geodatabase, hosted on DC gov servers.

Due to the spatial nature of the RSA dataset, data analysis will be conducted primarily using ESRI software and online tools (i.e. ArcGIS Pro, ArcGIS Online, Experience Builder, Dashboards). Data can be accessed from the RSA geodatabase via ArcGIS Online (including the RSA Dashboards) or by using ArcGIS Pro. As a best practice, data applications should utilize the MapServer connection to the RSA geodatabase when possible (i.e. when editing and select types of data manipulation is not necessary). The FeatureServer connection can be used when necessary, however staff seeking to use the Feature Server should be experienced using ArcGIS software and tools and/or seek out assistance from the RSA Program Lead and/or data management support team.

The RSA geodatabase is routinely backed-up, as is the server on which the geodatabase is hosted. RSA geodatabase backups occur daily during the field season. Daily back-ups will all be retained for 1 week. Every 7th day the back-up will be retained through the end of the field season. Upon completion of sampling and QAQC each season, a final back-up will be made and all other back-ups removed. Should the RSA Program be suspended, data will be archived for at least five years subsequent to project completion.

GROUP C: ASSESSMENT AND OVERSIGHT ELEMENTS

C1. Assessments and Response Actions

Careful planning and implementation of the project, documented instructions and SOPs, and use of qualified and experienced personnel are expected to prevent most problems associated with data quality or quantity. Any failure to meet data quality standards will be evaluated by the RSA Program Lead. If the cause is found to be equipment malfunction, maintenance will be performed and the equipment will be repaired or replaced when necessary. If the problem is found to be human error, personnel will be retrained and protocols will be assessed.

When a reach or point cannot be collected due to accessibility, safety, or other hindrance, the issue will be noted in the FieldMaps/Survey123 app. If results from a stream reach or point assessment are identified to be questionable or if metrics were missed during the assessment, the site will be investigated again during the next field season.

Data entry features and RSA field audits ensure that the quality of reported data is adequate for its intended use. Errors during data entry will be minimized by the use of conditional programing and pre-defined domains within the electronic data collection forms. User features built upon these features include pull-down lists of acceptable responses and warning messages for invalid data entry (i.e. missing response, out of range values). Staff certifications are detailed in the 'RSA Activities and Protocols for Quality Assurance and Quality Control' document (Appendix 2).

C2. Reports to Management

Reporting to the EPA is performed as described above in Section A7 Documents and Records. All documents, data, and reports are online accessible from the DOEE website. The RSA Program Lead will provide responses required in each years MS4 Annual Report (NPDES permit no. DC0000221) to the MS4 Program Manager for reporting to EPA. Progress towards RSA goals will also be published in each years MS4 Annual Report Storymap.

GROUP D: DATA REVIEW AND USABILITY

D1. Data Review, Verification, and Validation

Data review, validation, and verification provide methods for determining the usability and limitations of data and provide a standardized data quality assessment. Level A certified staff, with support from the RSA Program Lead and RSA QA Supervisor, will be responsible for reviewing their field data entries for completeness and adherence to QC requirements.

Additional evaluations will be performed to verify and validate the data and metric calculations. The 'QAQC Score Card' is used to evaluate whether data collected for QAQC meets the data quality objectives described in this QAPP (Section A5) and the 'RSA Activities and Protocols for Quality Assurance and Quality Control' document (Appendix 2).

All data generated through the RSA program is considered conditional until all QAQC activities described in the 'RSA Activities and Protocols for Quality Assurance and Quality Control' document are completed, at which time data is finalized.

Data are accepted or rejected based on results of the best professional judgment as guided by the QAQC Score Card (see Appendix 2 for more details). As necessary, the RSA QA Supervisor will make final determinations whether to accept, reject, or qualify the data.

D2. Validation and Verification Methods

Verification confirms that specified requirements have been fulfilled. The data will be evaluated for data completeness and consistency with overlapping quality control reaches. Metrics that are missing or data collected that deviate significantly from that which is expected will be subject to strenuous review and re-evaluation in the field.

Validation confirms that the particular requirements for a specific intended use are fulfilled. Data will be reviewed and examined for completeness, errors, and nonsensical results by the RSA Program Lead. The RSA Program Lead will also evaluate data for consistency using the 'QAQC Score Card'(See Appendix 2 for more details) and note any deviations from expected results.

D3. Reconciliation with User Requirements

Results of the verification and validation processes (see sections D1 and D2) will be reported to the RSA QA Supervisor who will make the final determination to reject data and remove the unusable data from the master geodatabase. If data does not receive a passing score using the 'QAQC Score card' (see Appendix 2) statistical procedures and best professional judgment will be applied to verify whether it is possible to draw the correct conclusions for the project with the remaining data. Limitations in the dataset will be officially documented in the RSA dataset metadata and available to all data users via the RSA Data Dashboard.

APPENDICES

Field Data Collection Guide for Rapid Stream Assessment

District Department of Energy & the Environment

Water Quality Division

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

Edition #7 (rev. 2023)

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Contact	Telephone
Field Team Coordinator:	Alicia Ritzenthaler alicia.ritzenthaler@dc.gov 202-774-7802 (cell)
For immediate threat to human health and/or the environment: **DC Fire and EMS Services (FEMS)** **DOEE Emergency Operations: Daniel Alexander** *For controlled spill (typically 5 gallons or less under control), minor equipment leaks, minor sheen, sediment plumes, or sewage (observed or odor):* **DOEE MS4 Operations: David Pilat**	**911** (202) 645-5665 daniel.alexander1@dc.gov david.pilat@dc.gov
Emergency/Police/Fire/Ambulance	911
Poison Control Center (National Toll Free)	(800) 222-1222
National Response Center	(800) 424-8802

Purpose

This *Field Data Collection Guide for Rapid Stream Assessment* documents data collection protocols, procedures, and assessment and scoring guidance for the evaluation of stream reaches conducted by DOEE's Natural Resources Administration. This guide is intended for use by field assessment teams to help ensure consistent data collection.

Important Safety Reminders

When conducting stream assessments, DOEE's number one priority is to do so safely. Important safety reminders include:

- Always conduct stream assessments in pairs.
- Do not enter high stream flows, such as after a rainstorm[1].
- Ensure you are visible, such as in high-traffic areas.
- Make sure you carry a charged cell phone in case of emergency.
- Make sure the field coordinator knows where you are conducting assessments for the day.
- Reschedule or take extra precautions in excessive heat
- Carry drinking water and considering bringing sun protection (e.g. hats, sunscreen) and insect repellant

[1] **Note**: there is no specific amount of time required to wait after a previous rainstorm; however, conditions in the stream reaches should not be substantially different than baseflow (e.g., not excessive high flows, high sediment in water, etc.). Field staff safety is the most important consideration. Staff will coordinate with Field Team Leads to determine when field work is appropriate after a rain event.

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RAPID STREAM ASSESSMENT OVERVIEW

The intent of the Rapid Stream Assessment (RSA) is to collect information to provide a high-level overview of the entire wadeable stream network within the District. This information can help identify potential issues as well as locations that may warrant follow-up inspections or more in-depth evaluations. The information from the RSA can also serve as a baseline with which to compare information from these assessments in the future.

The RSA includes several types of assessments including:

- Reach assessments:
    - Open channel (above-ground) streams
    - Closed channel (underground) streams
- Point assessments
- Watershed notes

Reach and Point assessment types, as well as watershed notes, are discussed further in the following pages.

*An assessment will **not** be performed if:*

- *There is no access to a site (e.g., site is fenced off, the property owners have expressly restricted site access),*
- *If there are dangerous conditions, or*
- *If the reach is part of the Anacostia or Potomac mainstems (only tributary reaches are assessed in the RSA).*

Reach Assessment: Open Channel Streams

Both perennial and temporary streams are evaluated through the RSA. Reach assessments are performed on 300-meter (approximately 1,000 foot) segments unless a change in stream character occurs first, which will trigger the beginning of a new stream reach. Changes in character may be the result of:

Note: metric as well as **approximate** *conversions in standard measurements (e.g., inches, feet) are provided to aid staff in quickly evaluating data in the field.*

- Changes in flow or water quality characteristics (*e.g.*, clarity, odor)
- Changes in stream geomorphology (*e.g.*, floodplain connectivity, approximate Rosgen classification)
- Changes of in-stream physical habitat (*e.g.*, substrate type, erosion, riparian area)

As shown in Figure 1, data collection will occur from downstream to upstream. The right and left banks will then be oriented as such while looking upstream.

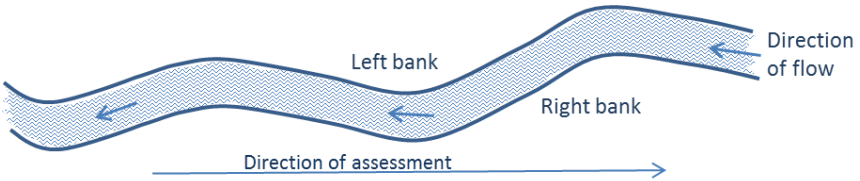


Figure 1. Direction of data collection

Additional discussion on differentiating between overall stream character and identifying the need for a Point Assessment, which captures these discrete issues, is included on page 8.

Within each stream reach, particular points of interest may be identified that are distinct from the overall stream character. This may include features such as a buffer deficiency, which may be visually distinct from the surrounding riparian area conditions.

It could also include distinct or discrete erosion points, which may be more dramatic than surrounding bank erosion.

For each stream reach:

- Basic data, such as field team members (check all that are participating in the survey), will be recorded.

  NOTE: if conducting Point Assessments, also ensure all staff are identified in the field app.

- A broad range of physical habitat metrics will be assessed for perennial reaches.
- An abbreviated assessment will be conducted on temporary reaches that includes fewer metrics.
- At least one representative photo will be provided for each reach regardless of flow type. Optional comments describing features of reach not fully captured in assessment questions.

How do I identify a temporary reach?

The RSA begins with a field crew following a perennial reach upstream. At some point in the assessment, flow will reduce and, ultimately, cease. While possibly dry during the RSA, there may be pathways for flow following rain events or when the water table is high.

Understanding temporary reaches is an important part of understanding the District's stream network. Identifying these temporary reaches, however, is often challenging as the channel can be inconspicuous, including being covered by leaves and lighter debris. Indicators of a temporary reach can include:

- *slight depression in the substrate*
- *presence of pools*
- *damp or black decomposing leaf litter*
- *silt or sediment accumulating on debris or plants*
- *drift lines where sticks, leaves, and other debris may accumulate on the streambank or surrounding vegetation*

A stream reach will be identified within the GIS-based field form as a line feature (as shown with the two red lines in Figure 2).

The process for identifying and assessing reaches includes:

1. Identifying where the stream reach begins (location "A")
2. Walking upstream from location "A"
3. Identifying any discrete issues that require a Point assessment (*e.g.*, dump sites, deficient buffers). See page 7 for additional information on conducting Point Assessments.
4. Keeping a tally of woody debris
5. Identifying when either 300 meters has been walked or there is a change in character that signifies the beginning of a new reach (location "B" in Figure 2)

The measurement tool in FieldMaps can be used to determine if 300 meters has been reached.

6. Drawing a line from the beginning of the reach (location "A) to the end of the reach (location "B")
7. Completing the questions associated with the stream reach metrics at location "B"

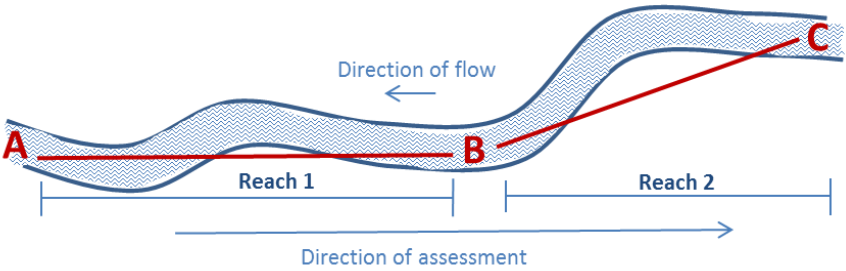


Figure 2. Open channel stream assessment

NOTE: The line depicting the stream reach (red line in Figure 2) may not coincide with the actual stream channel in some cases, which is acceptable in this assessment.

If staff encounter a section of stream that is too deep to survey, staff should get out of the stream and walk along the banks until it is shallow enough to re-enter safely.

- If the stream is too deep to survey for less than 75 ft:
    1. Staff should re-enter the stream when it is safe to do, so continue assessing the reach as usual.
        - For example, if a section of Rock Creek is too deep to survey for 40 ft, staff would exit the stream, continue making observations to the best extent possible from the shoreline, and re-enter the stream when it is shallow enough to continue wading. Staff should then continue until the end of the reach and/or it is again too deep to safely wade.
    2. Staff should add in the reach comments that there was a section of the stream that was too deep wade and note:
        - Approximate length of section that is too deep
        - Approximate location within the reach where the too deep section is found (i.e., 'near the beginning', 'in the middle', etc.).
        - Depth at which staff determined it was no longer safe to wade and exited the stream.
- If the stream is too deep to survey for over 75 ft:
    1. Staff should end the current reach where it becomes too deep to safely wade and complete the reach survey.
    2. Staff should then complete an 'Inaccessible reach survey', dropping a new point as necessary.
        - Choose the 'too deep' option in response to why the reach is inaccessible, add additional comments, and photograph.
    3. Staff should exit the stream and walk along the shoreline until it is again shallow enough to safely wade, at which point they can re-enter the stream.

- If staff can safely observe and assess point features from the shoreline they should continue to do so.

4. Staff should re-enter the stream when it is shallow enough to do so safely making a note of this location on the map. Rapid Stream Assessments can continue as usual from this location.

Reach Assessment: Closed-channel Streams

A closed channel, or underground or piped stream, is typically a conveyance that collects stream flow from an open channel and transports it to downstream point or another open channel reach. A simplified example is depicted in Figure 3, below. The process for identifying and assessing a closed-channel stream includes:

1. Assessing the preceding reach (Reach 1, Figure 2) as discussed on page 5.
2. Beginning to draw a line from location "B" (the beginning of the closed channel reach).

   NOTE: this initial line may be short and not extend yet the length of the channel.

3. Evaluating initial reach metrics at location "B" and taking necessary photos.
4. Proceeding upstream to location "C", the end of the closed-channel reach, where the remainder of the metrics will be evaluated, and additional photos will be taken.
5. Editing the line, if needed, to extend it fully to location "C".

Reach 3 (Figure 3) will then be assessed as discussed on page 5.

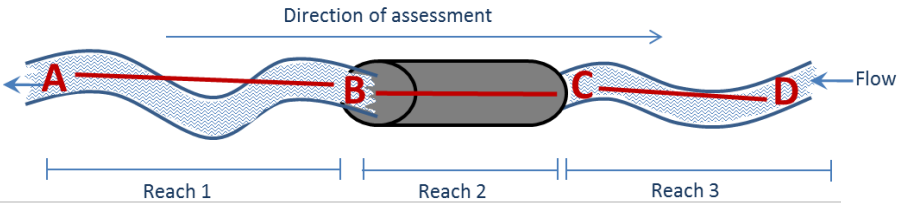


Figure 3. Closed channel stream assessment

Point Assessments

Points are considered locations within a stream reach where a distinct or discrete feature is identified. This includes:

- Deficient Buffers
- Crossings
- Dumpsites
- Erosion
- Pipes
- Utility lines
- Armored Banks
- Non-piped Blockage to Fish Passage
- Inaccessible Reach
- Reach does not Exist
- Other Impacts

Each Point Assessment can be flagged as requiring "urgent attention". This allows field staff to identify issues that will require additional follow-up. As the default for this question is "no", it must be actively changed to "yes" is a problem is flagged. Contacts are included in Appendix 4 of the QAPP.

General Data Collection Procedures

Field teams will:

- Collect information on the Point features encountered in each reach regardless of perennial or temporary status.
- Record each observed instance encountered in the field
- Place Point at center of each feature.
- Take at least one representative photo of each feature.

Closed-channel stream *– in line with the rest of the stream reach.*

Outfall *– pipes, ditches, and swales that discharges into a waterway.*

Crossing *– structure less than 75 meters that is placed across a waterway, such as a bridge. A crossing may also include culverts/ pipes through which stream flow moves.*

- Optional comments describing features of the reach not fully captured in assessment questions.

Evaluating stream character vs. discrete issues

Stream buffers, armored banks, and erosion issues are evaluated both through the Reach Assessments as well as the Point Assessments. These metrics, however, are evaluated in different ways.

> ***Reminder:*** *Points are discrete in nature - they are not representative of an entire reach nor reflect a change in character of the reach, which would necessitate the beginning of a new stream reach.*

In a Reach Assessment, *Riparian Vegetation* and *Riparian Width* are assessed. These metrics are used to reflect the average character of a stream reach.

A Point Assessment are used to evaluate a *erosion, armored banks,* or *deficient buffer* when that character is observed at a particular locationas opposed to being characteric of the entire reach.

Figure 4 demonstrates, in a simplified way, how buffers, armored banks, and erosion points can be evaluated differently. "A" shows a "patchwork" of riparian buffer representing the character of the stream in the Reach Assessment (where green is a riparian buffer and the white gap is the deficient buffer). Alternatively, "B" shows a more isolated and specific location along the reach that should be evaluated further through a Buffer Point Assessment.

> *More than one photo should be taken at a Point if additional visual information will help provide clarification of an issue at a particular location.*

Similarly, "C" shows how erosion is part of the overall stream character (depicted through a Reach Assessment), while there are

two discrete erosion points in “D” that can be specifically assessed through two Erosion Point Assessments.

NOTE: Points will be assessed as they are found as the field team walks the 300-meter (approximately 1,000 foot) stream reach (the reach may be shorter if it is determined the character of the reach has changed before this).

These Point assessments will be evaluated before the assessment for that Reach is completed. **It is important to finish either a point or a reach assessment before another is started. Data may be lost if field crews attempt to toggle between assessments.**

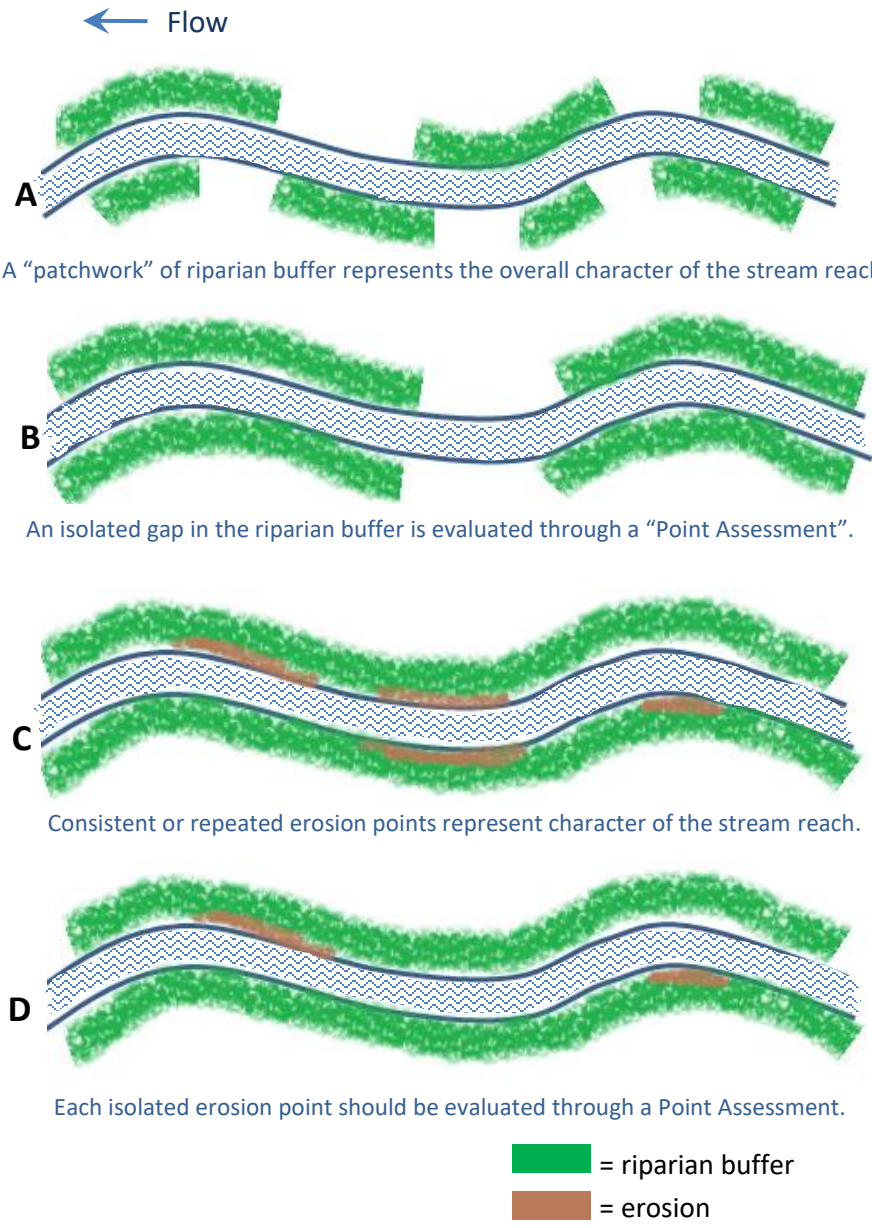


Figure 4. Differentiating between stream character and Point Assessments

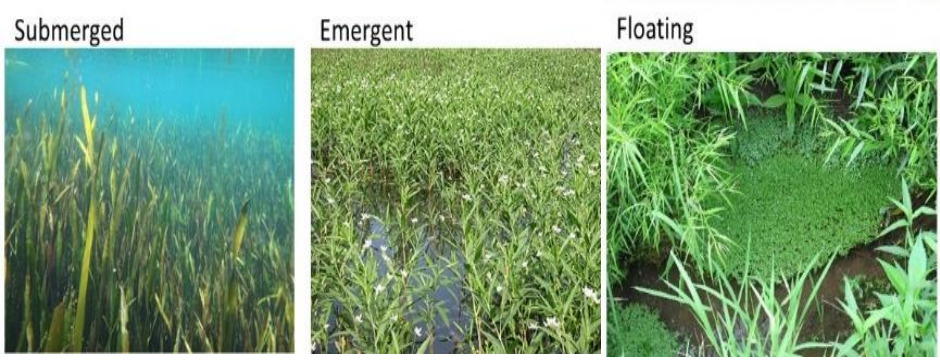
REACH ASSESSMENTS

Reach Assessment Metrics

For each stream reach, the following will be evaluated:

Water presence	Is water present: Yes / No • If water is present: is there flow or is the water stagnant/not flowing. • If water is not present, but there are characteristics indicative of a stream channel or previous flow, the field form will focus the evaluation on metrics such as, riparian buffer width, etc.
Water clarity	Choose one or more of the following: Clear / Foamy / Greenish / Dark Brown / Light Brown / Milky / Oily Sheen / Reddish / Turbid / Iron Floc / Other • If water clarity is characterized as “other”, describe in text box. • Take a photo of any water discoloration/ clarity issue that may be indicative of a larger issue or may warrant subsequent investigation.
Odor (from water or sediment)	Choose one or more of the following: Chlorine / Fishy / Petroleum / Rotten Eggs / Sewage / None / Other • If odor is characterized as “other”, describe in text box.

Maximum depth encountered	Record the maximum depth encountered along the reach in centimeters. • Enter as positive, numeric value (no fractions)
Average depth	Record the estimated average depth of the reach. <30 cm / 30-75 cm / >75 cm (<12 in / 12-30 in / >30 in)
Maximum width	Record the wetted width of the stream in meters. <1 m / 1- <3 m / 3 - <6 m / ≥ 6 m (<3 ft / 3- <10 ft / 10 - <20 ft / ≥ 20 ft)
Aquatic vegetation (not algae)	Choose one or more of the following (examples shown below): Submerged / Emergent / Floating / None If present, note if vegetation type is extensive.



Fish presence	Note if fish are absent or present. *(Only note if fish are seen, not if it is <u>possible</u> fish may be present)*
Algae	Note if algae are absent or present (examples shown below). • If present, note if algae area extensive (such as in the photos below). • If extensive, take a photo of the algae for subsequent evaluation.




If there is a question regarding any metric (e.g., if algae are extensive or not), drop an "other impacts" point, record observations in the comment section, and take a photo at that point for subsequent follow-up.

Bacteria presence	Note if bacteria are absent or present. Bacterial presence can be identified by what appears to be an oily sheen or a rusty coating on the stream bank (iron flocculant). If present: • Is it extensive? • If extensive, take a photo of the bacteria for subsequent evaluation. • Describe the character (iron floc / sheen / other).

Arlington Co. Virginia

Trash	Note if trash is: Absent – little or none visible in stream channel or riparian area Minor – trash present in minor amounts Moderate – trash present in moderate amounts Extensive – abundant and unsightly

<u>Trash abundance</u>:

1. Minor (e.g., one or two tires)
2. Moderate
3. Extensive (e.g., widespread within stream or riparian area)

Riparian vegetation width	Note the vegetation width on each side of the stream channel. Right bank: None / >0-25 m / >25-50 m / >50 m (>0-80 ft / >80-165 ft / >165 ft) Left bank: None / >0-25 m / >25-50 m / >50 m (>0-80 ft / >80-165 ft / >165 ft) Determine if any lack of vegetation is characteristic of the whole stream reach or if it is a discrete issue that will require further evaluation through a "Deficient Buffer" point assessment (reminder: see page 8).
Dominant riparian vegetation	Check all of the riparian vegetation types present within 50 meters of the stream (or visual distance of 50 meters is not within the sightline): Right bank: Grasses / Forbs / Shrubs / Trees / None / Other Left bank: Grasses / Forbs / Shrubs / Trees / None / Other • If "other" is specified, describe in text box. • Select which is dominant, if any.

A forb is defined as an herbaceous plant that is not a grass.

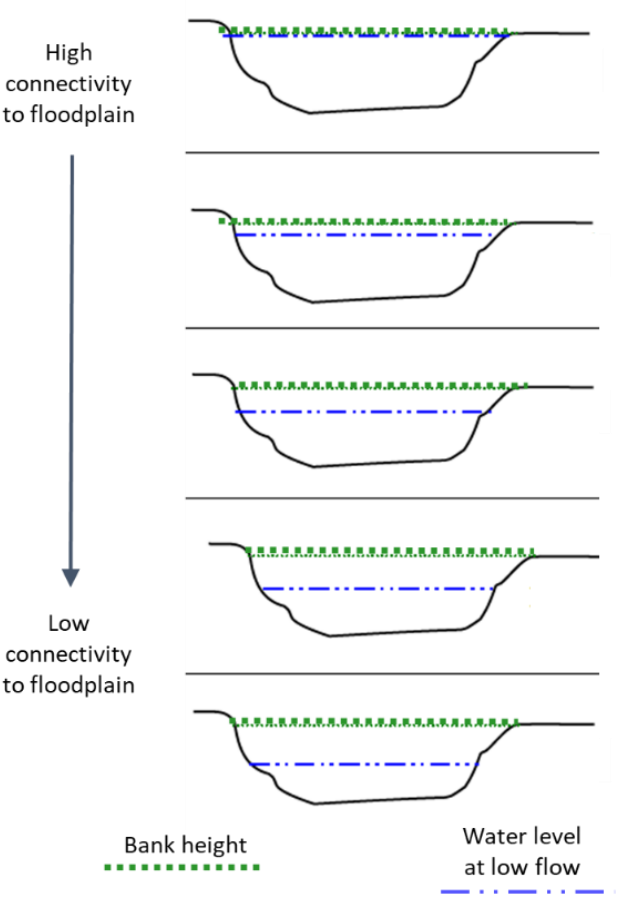
Armored bank *Note: Armoring should be characteristic of the reach. If armored bank is not the length of the reach, select no bank armoring and complete a POINT assessment for armored bank.*	Note if either bank is armored: • Left / Right / Both / No bank armoring If there is bank armoring present: • Material Concrete/stone wall/rip rap/other • Height 0-1m / >1- 3 m / >3 m 0-3 ft / >3-10 ft / >10 ft Take a photo of the armored bank, if present.
Substrate type	Check all that are present: Sand / Gravel / Clay / Cobbles / Boulders / Concrete Channel / Bedrock / Soil or Sediment / Other • Select which is dominant, if any.
Shading	Estimate degree and duration of shading during summer leaf-out as: Low shading – less than 25% shaded Medium shading – 25% to 75% High shading – more than 75% shaded

Floodplain Connectivity

The figure below provides a simplistic guide for evaluating how readily flows may escape the channel into the floodplain. Other indicators can include matted vegetation in the riparian area and deposition of sediment, trash or debris.

Characterize the connectivity to the floodplain:

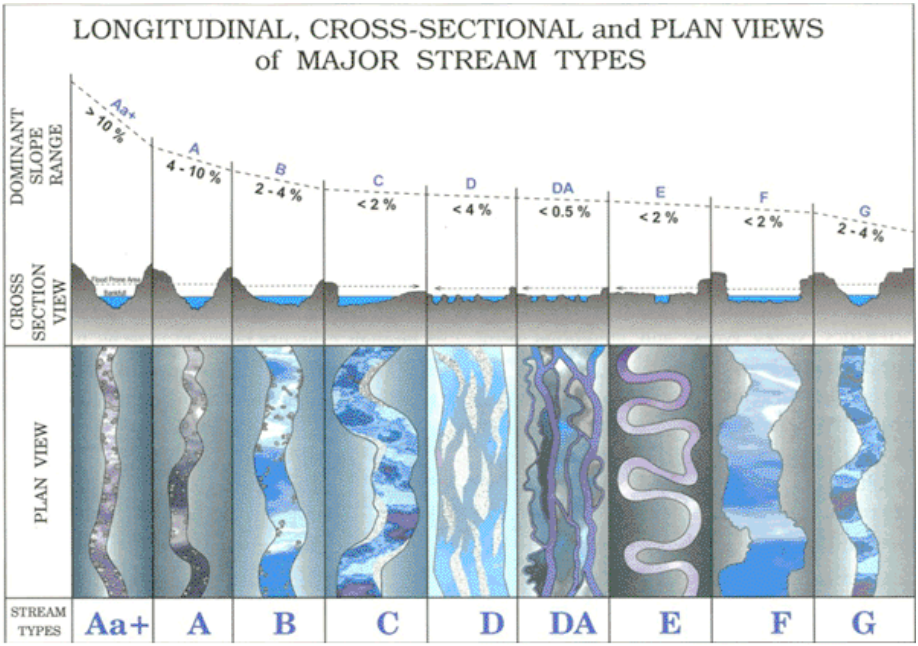
High / Medium / Low:



Bank erosion	Evaluate the impact of erosion on each bank. The banks are oriented by looking upstream. The right bank and left bank will be evaluated separately. Check all that apply: • None (little to no erosion is present or does not appear to be causing issues) • Instream degradation (e.g., substrate sedimentation, filling in of riffles) • Adding to sediment loading (e.g., turbidity) • Slumping banks • Falling trees/vegetation • Threat to property (e.g., buildings, yards) • Threat to infrastructure (e.g., bridge or road may collapse, fence may fall) • Exposed infrastructure (e.g., exposed pipe) • Other (describe observations)
Woody debris and root wads	Count the woody debris/root wads within the channel as the field team moves up stream. This should include: • Woody debris >10 cm (4 in) diameter, more than 1.5 m (5 ft) long • Root wads on live trees with a diameter at breast height (DBH) of at least 15 cm (6 in) • Only woody debris or root wads found in wetted (or likely to become wetted) portions of stream

Approximate Rosgen Classification

Perform quick estimate of Rosgen Level I stream type classification using the figure below. Additional prompts in the mobile data collection app can also be used to help you determine the correct classification.



Rosgen, David L. "A classification of natural rivers." Catena 22 (1994): 179. www.wildlandhydrology.com

NOTE: *Photos can be labeled within the data collection platform to help distinguish what the photo is of (e.g., 1st photo: "downstream view", 2nd photo "upstream view".*

The following flowchart can be used as a guide to help field staff identify the Rosgen classification of the stream reach being assessed:

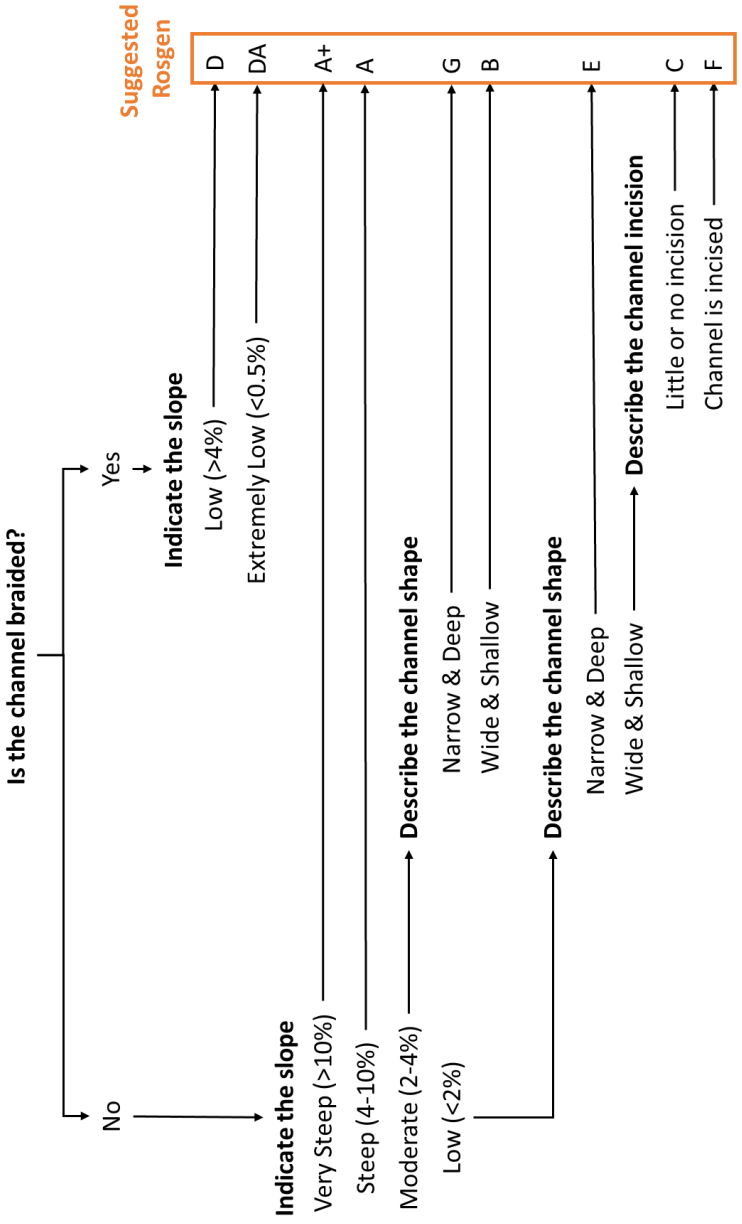


Photo Tips

Where possible, take photo from a location that best captures channel sinuosity and slope represented by the Rosgen category.

Recreation evidence	Identify if there is any evidence of recreation along the stream reach. Select all that apply: None / Rafts / Life jackets / Rope swings / Marked Trails / Unmarked Paths / Coolers / Fishing line / Other If “other” is selected, describe observations.
Reason for reach break	Enter the reason for the reach break. • Maximum reach length (300m/1000ft) • Character change • Upstream End If stream is inaccessible upstream, choose ‘upstream end’ and complete an inaccessible point assessment.

Photo Tips

Take photo within channel. Photo should capture channel cross section and floodplain (see below) and should be representative of entire reach.

POINT ASSESSMENTS

In addition to the point specific assessment questions described below, ALL point assessments will also include the following:

Urgency	Does this point require urgent attention? Yes/No Points are urgent if they present a safety issue and/or represent infrastructure failure.
DC Water Flag	Flag for DC Water? Yes/No Please flag all points which may be of interest to DC Water. Points of interest to DC Water may include, but is not necessarily limited to, exposed utility lines, missing manhole covers, broken/damaged outfalls, erosion surrounding or due to water/sewer infrastructure, etc.

Deficient Buffers

Deficient buffers are stretches of riparian area without sufficient canopy or understory. The deficient buffer may still include vegetation (*e.g.*, lawn) or may consist of impervious surface (*e.g.*, parking lot).

Buffer deficiencies should be recorded for areas within 50 meters (approximately 165 feet) of the stream channel.

Linear footage of the buffer deficiency should be reported as the longitudinal distance along the stream. A deficiency reported on both sides of the stream should be measured as the average distance on both sides of the stream.

Example: the deficiency should *not* be doubled if it appears on both sides of the stream; if there is 20 meters (65 feet) of deficiency on the right bank and 40 meters (130 feet) of buffer deficiency on the left bank, it should be recorded as 30 meters (approximately 100 feet) on both banks).

> ***Note:*** *The riparian area is considered 50 meters on each side of the stream reach, for a total of 100 meters.*

NOTE: Ensure that all staff that are conducting RSA Point Assessments are selected in the staff list (not just the team lead).

NOTE: When "urgent attention" is selected, this information will then be transferred automatically to the Dashboard, which will then keep a list of all items requiring follow-up. Team Leads will determine the appropriate follow-up action.

Stream bank where deficient buffer occurs	Looking upstream, on which side does the deficient buffer exist: • Right / Left / Both
Length of deficiency	The length of deficiency is the area along the length of stream. Estimate the length of the deficiency within one of the following: 0-25 m / >25-50 m / >50 m (80 ft / >80-165 ft / >165 ft)

Type of cover in deficient buffer area	Identify what types of cover are present within the 50-meter riparian area: Lawn / Invasives / Pavement / Structure (*e.g.*, retaining wall) / Other • If "other", describe in text box
Impact score	Estimate the extent of the impact that this deficient buffer has on the stream reach: • *Severe:* Impervious/commercial area in close proximity to the stream. Stream banks may be modified or engineered. Stream character such as bank/bed stability, sediment deposition, and/or shading is obviously degraded by adjacent use. • *Moderate:* Some impervious and/or just turf up to the bank. There is very little vegetation aside from turf within 50-meter (165 feet) riparian area. Stream character is likely degraded by adjacent uses. • *Minor:* Encroachment mostly from residential uses and yard; some vegetation within 50-meter riparian area, but very little other than turf within remainder of 50-meter riparian area. Stream character may be changed slightly by adjacent use. • *None:* Vegetated buffer primarily intact within 50-meters of stream.

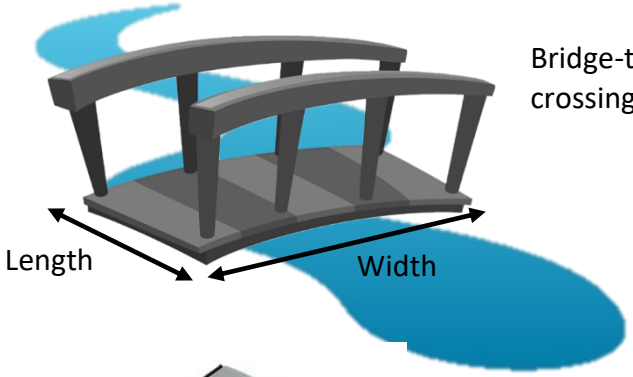
Photo Tips

Take photo that captures the buffer deficiency's proximity to the stream, if possible (*e.g.*, stream channel in the foreground). Also ensure that the buffer type is discernible.

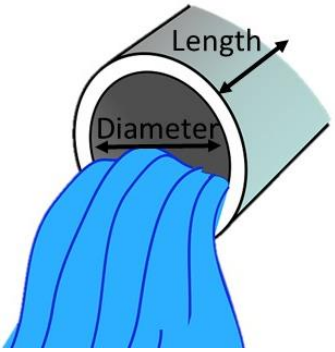
Crossings

Crossings are defined as points within the stream reach through which the stream must pass. This is different than an underground/ piped stream reach, which is in line with the remaining stream bed and is often longer than a crossing would be. If a crossing has already been documented, it will be included on the map included in the Collector tool that includes DCGIS GIS information.

For all Crossings, drop a point within GIS (if already inventoried, drop the point next to that which is already documented) and assess the following metrics.



Bridge-type crossing



Pipe-type crossing

Type	Box / Elliptical / Circular / Bridge / Foot Bridge / Other • If another type of crossing is identified, specify in the notes section.
Diameter/ width [measurement perpendicular to flow]	0-1m / >1-5m / >5m (0-3 ft / >3-16 ft / >16 ft)
Length [measurement parallel to flow]	0-1m / >1-5m / >5m (0-3 ft / >3-16 ft / >16 ft)
Material	Concrete / Corrugated Metal / Plastic / Wood / Other • If there is a material that is not one of the above, specify in the notes section.
Downstream debris	Yes / No
Downstream bed erosion	Yes / No Erosion height: 0-1m / >1-2m / >2m (0-3 ft / >3-6 ft / >6 ft) • Erosion here can include the measurement from the bottom of the pipe, culvert, etc. to the stream bed.
Downstream sediment	Yes / No

Upstream debris	Yes / No
Upstream bed erosion	Yes / No Erosion height: 0-1m / >1-2m / >2m (0-3 ft / >3-6 ft / >6 ft) • Bed erosion is measured from the bottom of the pipe to the bottom of the eroded stream bed.
Upstream sediment	Yes / No
Impact score	Estimate the extent that this crossing has on the stream reach: • *Severe:* Condition probably poses threat to road or other structure. Problem should be addressed to avoid bigger problem in future. • *Moderate:* Condition does not appear to pose threat to road or other structure but should be addressed to enhance stream integrity and future stability of structure. • *Minor:* Condition is noticeable but may not warrant repair. • *None:* No observable impact as a result of the crossing.

Photo Tips

Take photos at both the downstream and upstream ends of the crossing. If possible, take photos from within stream channel. Photo should provide appropriate context and include the crossing structure as well as the stream bed and banks. Include all barrels in single photo, if possible. Highlight erosion or sediment or debris deposition, if present, in additional photos, if needed.

Dumpsites

Dumpsites are points at which trash and debris has been purposely deposited (this is different than locations where trash appears to accumulate, although in some cases, distinguishing these may be difficult.

In general, record only dumpsites encountered within your visual distance within the riparian area.

Bank where the dumpsite is located	Right / Left / Both • Reminder: bank side (right or left) is determined by looking upstream.
Location of the dumpsite	Bank / Floodplain / Instream /Other • If “other”, specify in the notes section
Cleanup potential	Yes / No • Consider the ease of access, the weight or bulk of the items, and any potential hazards to cleanup crews
Dumped material	Appliances / Petroleum / Tires / Trash / 55-gal drum / Other • If “other”, specify in the notes section
Trash volume	<20 sq. m / 20-200 sq. m / >200 sq. m (<215 sq ft / 215-2,150 sq ft / > 2,150 sq ft) • When estimating the volume of material at the dumpsite, this value must be a compacted volume. Estimates of volume should ignore void space and account only for the volume of physical materials that compromise the objects.

Impact score	*Severe:* Active and/or threatening. Material may be considered toxic or threatening to environment (concrete, petroleum, empty 55-gallon drums) or site is large (>750 sq. meters / 8,073 sq ft). *Moderate:* Dumpsite (<750 sq. meters) containing non-toxic material, does not appear to be used often, however clean-up would be a benefit. *Minor:* Dumpsite appears small (<20 sq. meters / 215 sq ft) and material stable (will not likely be transported downstream by high water). Not high priority. *None:* No observable impact as a result of the dumpsite.

Photo Tips

Take photo that captures context of dumpsite relative to the stream, if possible. Take additional photos that capture the largest impact items.

Erosion

This Point Assessment is triggered by the identification of discrete erosion point that is distinct in nature from the character of the rest of the stream reach.

- Discrete areas of erosion along a reach may be aggregated into a single point as long as the characteristics and impacts are identical. For instance, similar erosion on both sides of a particular area of the stream bank can be included as one point.
- Multiple erosion points should be placed along the stream reach when erosion crosses a reach break (*e.g.*, erosion that spans two or more reaches).
- The length of the erosion point should be reported as the longitudinal distance along the stream.
- Reminder: bank side (right or left) is determined by looking upstream.

Erosion location	Note the side of the bank experiencing erosion: (Right / Left / Both)
Length	Note the length of the erosion point: Right bank: 0-3 m / >3-5 m / >5-8 m / >8 m (0-6.5 ft / >6.5-16 ft / >16- 26 ft / >26 ft) Left bank: 0-3 m / >3-5 m / >5-8 m / >8 m (0-6.5 ft / >6.5-16 ft / >16- 26 ft / >26 ft)

Bank height	Identify the bank height at the point of erosion: Right bank: 0-1m / >1-2m / >2-3m / >3-4m / >4-5m / >5-6m / >6m (0-3.5 ft / >3.5-6.5 ft / >6.5-10ft / >10-13 ft / >13-16 ft / >16-20 ft / >20 feet) Left bank: 0-1m / >1-2m / >2-3m / >3-4m / >4-5m / >5-6m / >6m (0-3.5 ft / >3.5-6.5 ft / >6.5-13 ft / >13-16 ft / >16-20 ft / >20 feet)
Impact	Evaluate the impact of erosion on each bank. The banks are oriented by looking upstream. The right bank and left bank will be evaluated separately. Check all that apply: • None (little to no erosion is present or does not appear to be causing issues) • Instream degradation (e.g., substrate sedimentation, filling in of riffles) • Adding to sediment loading (e.g., turbidity) • Slumping banks • Falling trees/vegetation • Threat to property (e.g., buildings, yards) • Threat to infrastructure (e.g., bridge or road may collapse, fence may fall) • Exposed infrastructure (e.g., exposed pipe) Other (describe observations)

Photo Tips

Take photos that capture bank(s) with erosion in context of the stream. Also include area upstream or downstream of immediate erosion, if possible.

Pipes

Pipes, or discharge points to open channels, are discharges into the stream reach. In general, record only pipe outfalls that are encountered within your line of sight within the riparian area.

Standing water in a downstream channel should not be used as a surrogate for discharge quality parameters when no flow is present. Poor quality standing water should be noted, however, in the *Notes* field.

Upon locating a pipe that discharges into the stream reach, determine if the pipe/discharge point is currently included/documented in the GIS reference data layer.

> ***Note:*** *It can be difficult to know if a pipe or outlet has just been placed on the map in the wrong location or if it is actually missing from the map and needs to be added. If there is a question regarding this, drop a point and flag it for follow-up.*

- <u>If the Pipe is documented in the GIS reference data layer:</u>
    - Drop a point within GIS or, if applicable, select the existing RSA point corresponding to this pipe
    - Assess the metrics below.
- <u>If the Pipe is **not** documented in the GIS reference data layer:</u>
    - If the pipe has no discharge, no action or assessment is necessary.
    - If the pipe has discharge, assess metrics below

Bank where pipe is located	Right / Left / End of outfall reach

Pipe diameter	0-15cm / >15-30cm / >30-45cm / >45cm (0-6 inches / >6-12 inches / >12-18 inches / >18 inches)
Type of pipe material	Clay / Corrugated Metal / High-density Polyethylene (HDPE) / Iron / Polyvinyl Chloride (PVC) / Reinforced Concrete / Riprap / Other • If there is another type of material used, specify in the notes section
Floating solids/ trash	Yes / No
Erosion due to pipe	None / Minor / Moderate / Severe *Severe:* Large area of erosion that is damaging stream habitat and/or causing obvious instream degradation. *Moderate:* Moderate area of erosion that may be damaging habitat and causing some instream degradation. *Minor:* Minor area of erosion, no noticeable instream degradation.

Impact	Severe / Moderate / Minor / None *Severe:* Pipe causing a severe erosion and/or has discharge which may be illicit. *Moderate:* Pipe has discharge occurring but there is no indication this discharge is illicit. *Minor:* Pipe is causing some erosion but there is no discharge occurring. *None*: Pipe is not causing erosion problem and no discharge is occurring. No observable impact as the result of the pipe. • If severe, take a photo of the location
Discharge concern	Indicate all immediate concerns regarding this discharge which may indicate there is an illicit connection. Sheen (e.g., oil, bacterial) / Odor (e.g., chlorine, fishy, petroleum, sewage, rotten eggs) / Discharge is foamy or ill colored (e.g., greenish, dark brown, milky, reddish) / Deposit or Stain / Other / None • If “other”, specify in the text box. • Enter “none” if discharge has no concerning characteristics.

Photo Tips

Context is important, do not zoom in on pipe opening, include flow path out of pipe and erosion, if present.

Utility Line

Utilities are sometimes found near or crossing stream channels. In some cases, these crossings can impact the stream channel by causing erosion or by leaking pipe contents.

Utility line type	Is this an exposed sewer line: Yes / No • If not, note what type of utility line it is by entering text into the associated text box.
Utility line diameter	What is the diameter of this utility line? 0-6in / >6-12in / >12-18in / >18in
Utility line material	Note the type of material the utility line is made of from the drop-down list: Clay / Corrugated Metal / High-density Polyethylene (HDPE) / Iron / Polyvinyl Chloride (PVC) / Reinforced Concrete / Riprap / Other
Utility line condition	Categorized the condition of the utility line: • Poor: utility line is exposed and in need of immediate repair or repair in the future • Fair: Utility line Is exposed and aging • Good: Utility line is exposed, but condition of pipe does not warrant urgent attention Take a photo of the utility line, being sure to capture any leaks or associated impacts to the stream reach.

Photo Tips

Include location of utility line relative to stream and/or banks. Use additional photos as necessary to capture any erosion or other impacts.

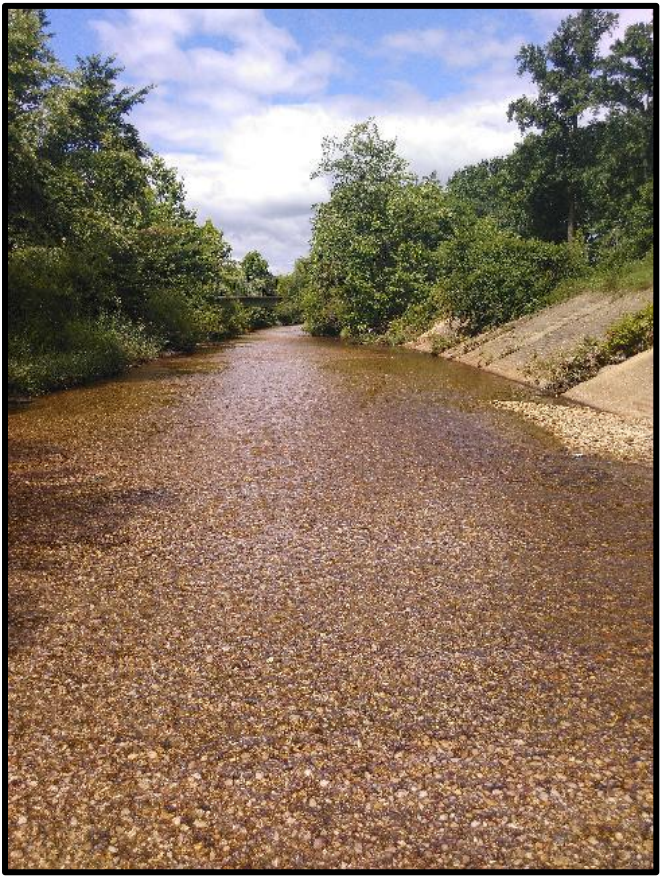
Armored Bank

This Point Assessment is triggered by the identification of discrete bank armoring that is not characteristic of the rest of the stream reach.

Select which bank(s) are armored:	Left / Right / Both
Material	What material(s) is the left/right bank armored with? Concrete / Stone / Rip-Rap / Other
Height	What is the height of the left/right bank armoring? 0-1m / >1- 3 m / >3 m 0-3 ft / >3-10 ft / >10 ft
Length	What is the length of the left/right bank armoring? 0-2m / >2- 5 m / >5 m 0-6 ft / >6-16 ft / >16 ft

Photo Tips

Context is important. Try to capture the material and extent of the armored bank in the photo. Use additional photos as necessary.



Fish passage

Blockages to fish passages are locations where there is greater than a **0.3 meters** (approximately one foot) change in stream bed elevation.

Fish blockage present	Record only non-piped blockages. Blockages will be assumed to be possible up/ downstream of all closed channel reaches. Record the height of the fish blockage: 0.3-0.5 meters / >0.5-1 meters / >1 meter (1-1.6 feet / >1.6-3.3 feet / >3.3 feet) Take at least one photo of the fish blockage. Note if the blockage is natural or man-made.

Inaccessible Reach

Occasionally, a stream reach that should be assessed may be visible, but inaccessible, from the location where the field team is currently assessing. For instance, a side channel may require assessment, but access to this reach may be blocked by a fence or is too deep.

The location of this inaccessible reach will be identified by dropping a point in GIS. Include in the comment box any information that may be needed for the subsequent investigation.

Stream Does Not Exist

Occasionally, the hydro-line reference data indicates a stream is present when there is no such stream. When it is determined that no stream exists (perennial or intermittent/ephemeral) a point will be dropped and a very brief survey (comments, photo) completed to record that this stream was not mistakenly missed.

Wetlands/Possible Wetlands

When wetlands, or evidence of possible wetlands, are found while conducting Rapid Stream Assessments a 'wetlands/possible' wetlands point should be added to the map and the short, associated survey completed. Assessment staff should leave a comment in the survey noting the evidence observed and take at least one photo. Wetland/Possible wetland assessment points will be shared with DOEE's Regulatory Review Division staff for subsequent follow-up as applicable.

Other Impacts

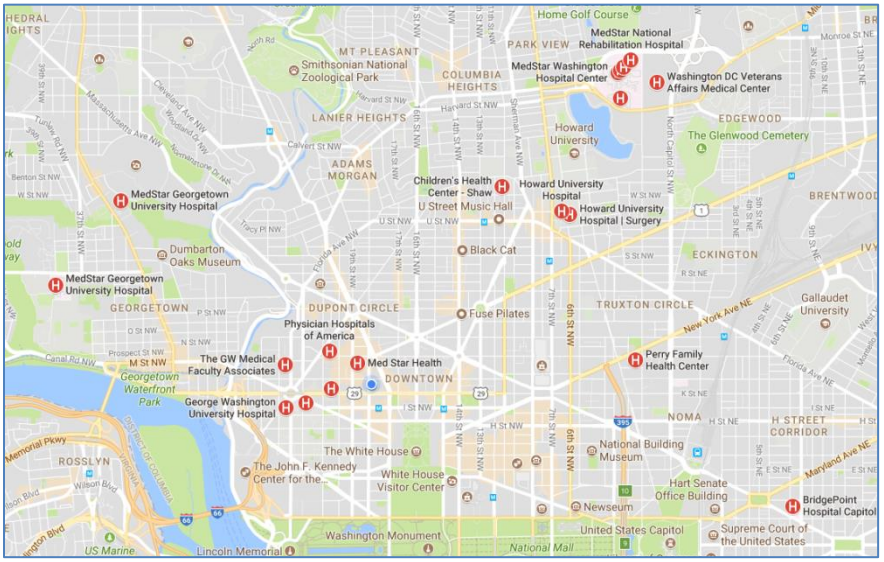
Any additional issues identified by field staff during the RSA (*e.g.*, erosion and sediment control violations; exposed utilities that are causing erosion issues; anything unsafe, such as sudden drops from an outfall, partially collapsed crossing, etc.) should also be documented. To do this:

- Select “Other Impacts”
- Drop a point
- Take one or more photos of the impact
- Provide a brief description of the impact in the notes section

Watershed Notes

Due to the comprehensive nature of the RSA, it is possible that field staff may make observations representative at a watershed scale, in addition to individual stream reaches. When field staff make these observations they should be documented as ‘watershed notes’ either in the FieldMaps app or on the Internal RSA Data Dashboard. These can include information that may be important for another team to know, where the team stopped for the day, issues with access, general observations on the stream/watershed character, etc.

Hospitals/Emergency Care Facilities



Hospital	Address	Phone Number
George Washington University Hospital	900 23rd Street NW	202-715-4000
MedStar Georgetown University Hospital	3800 Reservoir Road NW	855-546-2805
Howard University Hospital	2041 Georgia Ave NW	202-865-6100
Sibley Memorial Hospital	5255 Loughboro Road NW	202-537-4000
MedStar Washington Hospital Center	110 Irving Street NW	202-877-7000

RSA Activities and Protocols for Quality Assurance & Quality Control

District Department of Energy & the Environment

Water Quality Division

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

2024

Edition #5

LimnoTech
Water Environment | Scientists Engineers

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Purpose

The District Department of Energy & Environment (DOEE)'s Rapid Stream Assessment (RSA) Program was created in order to provide a high-level evaluation of all wadable streams in the District and address portions of the District of Columbia's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit issued by the U.S. Environmental Protection Agency (USEPA).

This manual describes the activities and protocols that have been established to ensure that the quality assurance and quality control (QAQC) standards defined in this document and in the RSA Quality Assurance and Protection Plan (QAPP) are upheld.

Contents

Overview of QAQC Activities

Quality Assurance and Quality Control (QAQC) activities for the Rapid Stream Assessment Program consist of two key components: staff certification and field verification.

The purpose of staff certification is to ensure that all staff participating in the Rapid Stream Assessment Program have the necessary knowledge to safely and accurately carry out RSA data collection responsibilities.

The purpose of field verification is to ensure that data collection is occurring in a manner without undue subjectivity. The results of field verification may be used to inform staff training and data usability decisions.

Staff Certification

All certification related records (i.e., certification levels, attendance at training activities, skills quiz results) shall be maintained by the RSA Program Lead. Records will be available via the Internal RSA Dashboard and saved on the Water Quality Divisions network drive (\\ddoefile02\wqd\Rapid Stream Assessment Documentation).

Certification Levels

All staff routinely participating in the RSA program shall be certified to conduct these assessments. Required certification level will be based upon the role each staff member is anticipated to fulfill throughout the upcoming field season.

Uncertified individuals may participate in RSA Data Collection at the discretion of the Level A certified team member(s) responsible for that days' assessments.

Level A certification indicates that a staff person is an expert in the RSA program.

Level A certification can be obtained by staff members who have:

- Held Level B certification in the immediately proceeding field season OR held Level B or higher (i.e. Level A) certification during 2 of the 3 most recent field seasons; and
- Successfully completed annual training; and
- Passed a required Level A Skills Quiz; and
- Participated in the annual training review session; and
- Participated in the Level A Field Team Day

Level A certification is maintained by:

- Successfully completing annual training; and
- Passing an annual Level A Skills Quiz; and
- Participated in the Training Review session; and
- Participate in the Level A field team day; and
- Completing a minimum of 6 days participating in RSA field data collection (including field verification) annually

Level B certification indicates that a staff person has demonstrated a working knowledge of RSA data collection but does not have significant experience conducting assessments. Level B certified staff should be paired with a Level A certified staff person when conducting RSA data collection.

Level B certification can be obtained by staff members who have:

- Successfully completed annual training; and
- Passed a Level B Skills Quiz; and
- Participated in the All-Staff Field Team Day.

A Level B staff persons should complete Level B certification each year they anticipate participating in Rapid Stream Assessments.

If a staff member joins the RSA Team for the first time after the start of the field season, the Level B Field Team Day may be substituted for a field shadowing day with Level A certified staff.

Annual Training and Review

All staff participating in the RSA program will participate in annual training activities. Annual training will be held each spring each spring within one month prior to RSA activities commencing. Training will consist of online, recorded modules and an in-person/hybrid review session led by Level A certified team members.

Skills Quiz

All staff participating in the RSA program should pass either a Level A or Level B skills quiz depending on their certification level. A passing grade is considered 85% or better. Following the annual training review session, any staff members who did not pass their initial skills quiz can retake the quiz up to 2 additional times.

Field Lead/Team Day

Following Annual Training (including review) and skill quizzes, all staff will participate in an in-person, Field Team Day.

The Level A Field Team day will consist of all Level A certified team members assessing 1-2 reaches together. Participants will communicate with each other everything they're observing and discuss in real-time how each observation should be accounted for during the Rapid Stream Assessment. They will also discuss best practices and share 'tips and tricks' for conducting assessments with each other. The purpose of this collaborative assessment day is to ensure that all Level A certified staff are assessing streams as objectively as possible and that, when subjective observations are made, staff record them as consistently as possible between themselves.

The Level B Field Team day will be held in the same stream reaches that the Level A Field Team day occurred. Level B field team members will divide themselves into small groups each lead by Level A certified team members. Level A certified team members will lead their group in a guided assessment of 1-2 stream reaches followed by an opportunity for Level B certified team members to

practice assessing 1-2 stream reaches independently with a Level A certified team member available for questions and additional guidance.

Field Verification

The purpose of field verification is to ensure reproducible data are being collected and that the RSA assessments are not being unduly impacted by subjectivity. Field verification is performed by multiple assessment teams completing a RSA of the same stream reach(s) independently from one another and comparing assessment responses.

Field verification will occur at the start of the field season and at the approximate mid-point of the field season. Field verification is planned at these intervals to ensure that corrective actions (i.e. additional training, updating protocols) can be taken, if necessary, in a timely fashion.

Data Collection

During each data collection period (i.e. field season start and mid-point), a minimum of 10 reaches will be assessed in duplicate. To ensure that field verification is not unnecessarily biased by staffing assignments, a minimum of 6 RSA team members, including at least 4 different Level A certified team members, should participate in data collection whenever possible.

Field verification data collection at the start of the season will be conducted by Level A certified field staff. Both Level A and Level B field staff should participate in mid-season field verification data collection. Teams should be representative of the typical field assessment team and, to the extent possible, assigned at random. Streams to be assessed during field verification should also be selected at random when possible.

Duplicate assessments of individual reaches should be conducted on the same day, at least 30 minutes apart to minimize influence on

each other. Not all 10 reaches need to be assessed in a single day, however effort should be made to complete field verification data collection within a 2 week period so that data assessments can be completed in a timely fashion.

During field verification, staff will use the 'Field Verification Map' in FieldMaps as opposed to the standard RSA Field Map used for primary data collection. The Field Verification Map is identical to the standard RSA Field Map except that map feature pop-ups are set to display the previous rounds' assessment responses instead of the most recent responses so that the duplicate assessment team does not inadvertently reference the earlier teams' assessment.

Data Assessment

Field verification data will be assessed based on the following Quality Control (QC) Goals:

1. Percent of Identical Responses, by metric
2. Percent of Acceptable Responses, by metric
3. Percent of All Acceptable Responses *(Reaches only)*
4. Percent of All Passing Metrics *(Reaches only)*

Targets for each goal are defined in the QAQC Score Card MASTERCOPY.xlsx file (Appendix A).

Based on the criteria detailed in the QAQC Score Card MASTERCOPY.xlsx file, each metric of a duplicate assessment is assigned a scored of:

Grade A – Identical Responses,
Grade B – Acceptable Responses, or
Grade F – Failing Responses

To assess field verification data, scores should be entered into the 'Scoring Sheet' tabs of the QAQC Score Card MASTERCOPY.xlsx file which calculates the achieved QC goals and compares them to the QC goal targets.

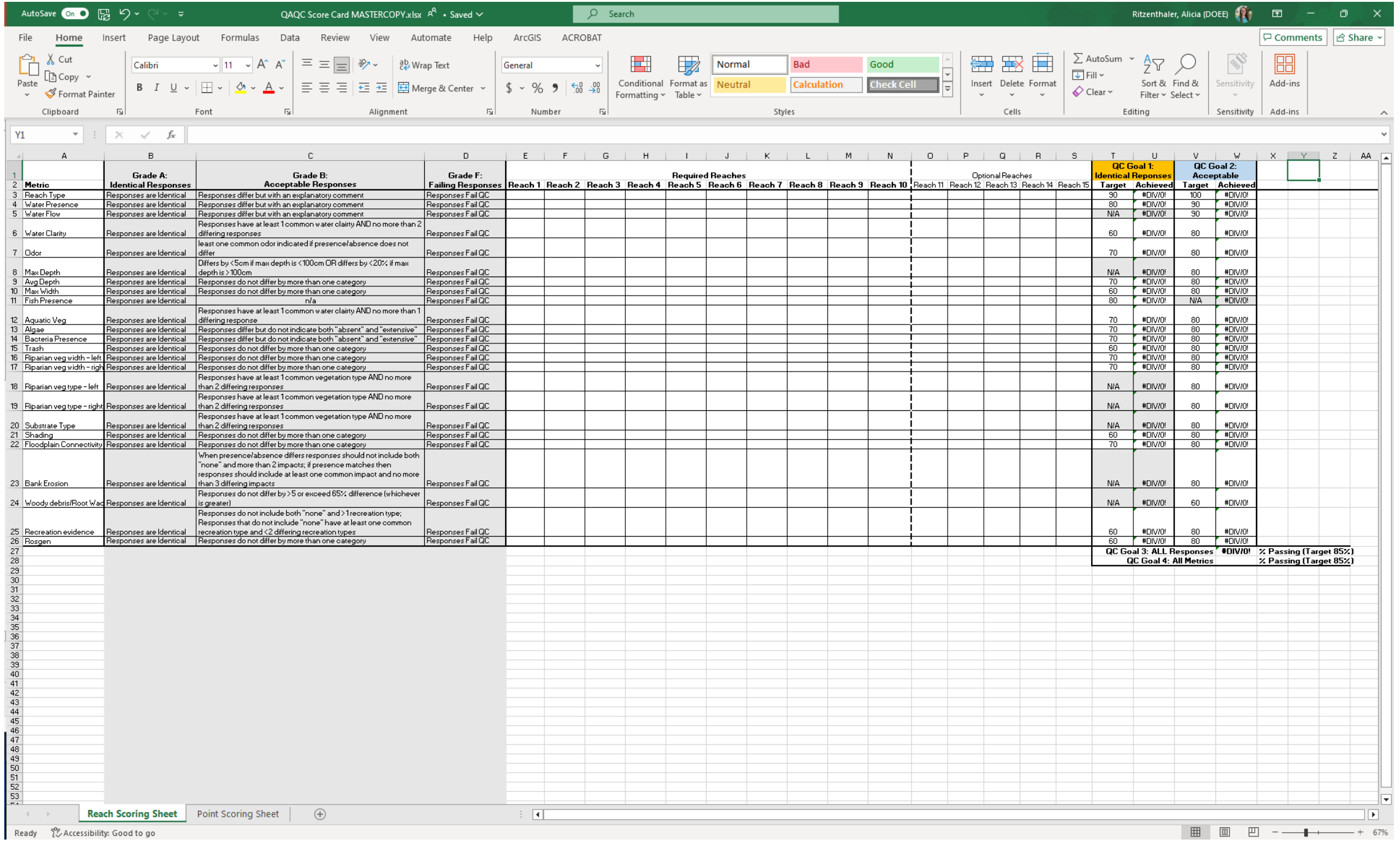
If field verification data exceeds expected variation (i.e. one or more QC Goal is not achieved), the appropriate corrective action (i.e. additional training, updated protocol, recollection, assignment of data quality flags) will be taken as is detailed in the project's Quality Assurance and Protection (QAPP).

In addition to the quantitative data analysis described above, photos will also be reviewed by the RSA Program Lead and/or QAQC Reviewer to verify that best photography practices are being followed (i.e. appropriate framing of assessment feature(s), presence people and/or other features that can be used to provide a sense of scale).

All records related to field verification data assessment shall be retained on the Water Quality Divisions network drive (\\ddoefile02\wqd\Rapid Stream Assessment Documentation).

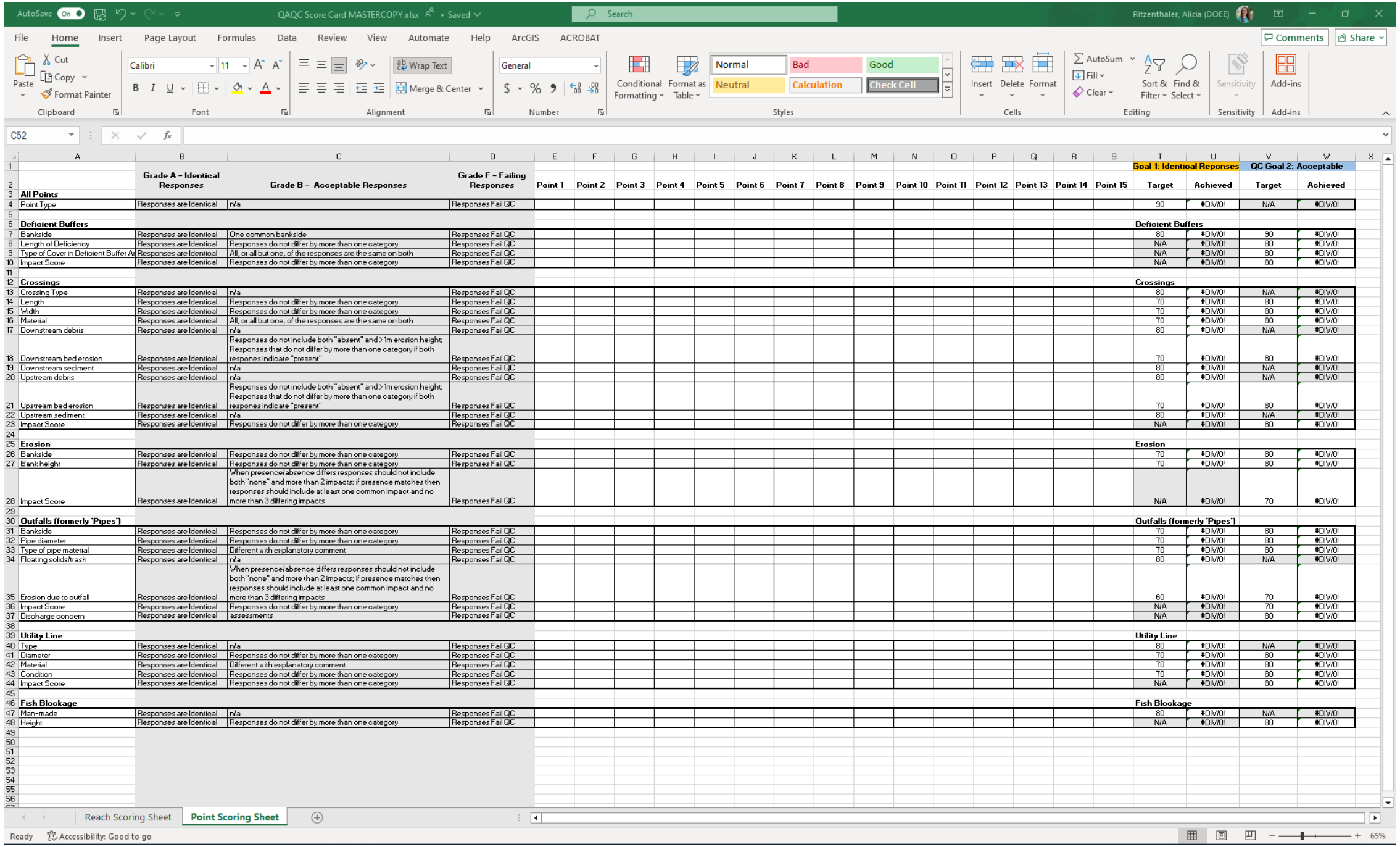
Appendix A: QAQC Score Card

Saved at:
\\wqd\MS4 Administration\2023-2028 permit\Rapid Stream Assessment Program\QAQC Score Card MASTERCOPY.xlsx



	Grade A: Identical Responses	Grade B: Acceptable Responses	Grade F: Failing Responses	Required Reaches										Optional Reaches					QC Goal 1: Identical Reponses		QC Goal 2: Acceptable	
Metric				Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11	Reach 12	Reach 13	Reach 14	Reach 15	Target	Achieved	Target	Achieved
Reach Type	Responses are Identical	Responses differ but with an explanatory comment	Responses Fail QC																90	#DIV/0!	100	#DIV/0!
Water Presence	Responses are Identical	Responses differ but with an explanatory comment	Responses Fail QC																80	#DIV/0!	90	#DIV/0!
Water Flow	Responses are Identical	Responses differ but with an explanatory comment	Responses Fail QC																N/A	#DIV/0!	90	#DIV/0!
Water Clarity	Responses are Identical	Responses have at least 1 common water clairty AND no more than 2 differing responses	Responses Fail QC																60	#DIV/0!	80	#DIV/0!
Odor	Responses are Identical	least one common odor indicated if presence/absence does not differ	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Max Depth	Responses are Identical	Differs by <5cm if max depth is <100cm OR differs by <20% if max depth is >100cm	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!
Avg Depth	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Max Width	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																60	#DIV/0!	80	#DIV/0!
Fish Presence	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!
Aquatic Veg	Responses are Identical	Responses have at least 1 common water clairty AND no more than 1 differing response	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Algae	Responses are Identical	Responses differ but do not indicate both "absent" and "extensive"	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Bacteria Presence	Responses are Identical	Responses differ but do not indicate both "absent" and "extensive"	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Trash	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																60	#DIV/0!	80	#DIV/0!
Riparian veg width - left	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Riparian veg width - right	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Riparian veg type - left	Responses are Identical	Responses have at least 1 common vegetation type AND no more than 2 differing responses	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!
Riparian veg type - right	Responses are Identical	Responses have at least 1 common vegetation type AND no more than 2 differing responses	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!
Substrate Type	Responses are Identical	Responses have at least 1 common vegetation type AND no more than 2 differing responses	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!
Shading	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																60	#DIV/0!	80	#DIV/0!
Floodplain Connectivity	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!
Bank Erosion	Responses are Identical	When presence/absence differs responses should not include both "none" and more than 2 impacts; if presence matches then responses should include at least one common impact and no more than 3 differing impacts	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!
Woody debris/Root Wad	Responses are Identical	Responses do not differ by >5 or exceed 65% difference (whichever is greater)	Responses Fail QC																N/A	#DIV/0!	60	#DIV/0!
Recreation evidence	Responses are Identical	Responses do not include both "none" and >1 recreation type; Responses that do not include "none" have at least one common recreation type and <2 differing recreation types	Responses Fail QC																60	#DIV/0!	80	#DIV/0!
Rosgen	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																60	#DIV/0!	80	#DIV/0!

QC Goal 3: ALL Responses	#DIV/0!	% Passing (Target 85%)
QC Goal 4: All Metrics		% Passing (Target 85%)



AutoSave On | QAQC Score Card MASTERCOPY.xlsx • Saved | Search | Ritzenthaler, Alicia (DOEE)

File Home Insert Page Layout Formulas Data Review View Automate Help ArcGIS ACROBAT | Comments | Share

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C52

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1																				Goal 1: Identical Reponses		QC Goal 2: Acceptable		
2		Grade A – Identical Responses	Grade B – Acceptable Responses	Grade F – Failing Responses	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Target	Achieved	Target	Achieved	
3	**All Points**																							
4	Point Type	Responses are Identical	n/a	Responses Fail QC																90	#DIV/0!	N/A	#DIV/0!	
5																								
6	**Deficient Buffers**																			**Deficient Buffers**				
7	Bankside	Responses are Identical	One common bankside	Responses Fail QC																80	#DIV/0!	90	#DIV/0!	
8	Length of Deficiency	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
9	Type of Cover in Deficient Buffer Ar	Responses are Identical	All, or all but one, of the responses are the same on both	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
10	Impact Score	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
11																								
12	**Crossings**																			**Crossings**				
13	Crossing Type	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
14	Length	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
15	Width	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
16	Material	Responses are Identical	All, or all but one, of the responses are the same on both	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
17	Downstream debris	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
18	Downstream bed erosion	Responses are Identical	Responses do not include both "absent" and >1m erosion height; Responses that do not differ by more than one category if both respones indicate "present"	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
19	Downstream sediment	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
20	Upstream debris	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
21	Upstream bed erosion	Responses are Identical	Responses do not include both "absent" and >1m erosion height; Responses that do not differ by more than one category if both respones indicate "present"	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
22	Upstream sediment	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
23	Impact Score	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
24																								
25	**Erosion**																			**Erosion**				
26	Bankside	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
27	Bank height	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
28	Impact Score	Responses are Identical	When presence/absence differs responses should not include both "none" and more than 2 impacts; if presence matches then responses should include at least one common impact and no more than 3 differing impacts	Responses Fail QC																N/A	#DIV/0!	70	#DIV/0!	
29																								
30	**Outfalls (formerly 'Pipes')**																			**Outfalls (formerly 'Pipes')**				
31	Bankside	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
32	Pipe diameter	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
33	Type of pipe material	Responses are Identical	Different with explanatory comment	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
34	Floating solids/trash	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
35	Erosion due to outfall	Responses are Identical	When presence/absence differs responses should not include both "none" and more than 2 impacts; if presence matches then responses should include at least one common impact and no more than 3 differing impacts	Responses Fail QC																60	#DIV/0!	70	#DIV/0!	
36	Impact Score	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																N/A	#DIV/0!	70	#DIV/0!	
37	Discharge concern	Responses are Identical	assessments	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
38																								
39	**Utility Line**																			**Utility Line**				
40	Type	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
41	Diameter	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
42	Material	Responses are Identical	Different with explanatory comment	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
43	Condition	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																70	#DIV/0!	80	#DIV/0!	
44	Impact Score	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
45																								
46	**Fish Blockage**																			**Fish Blockage**				
47	Man-made	Responses are Identical	n/a	Responses Fail QC																80	#DIV/0!	N/A	#DIV/0!	
48	Height	Responses are Identical	Responses do not differ by more than one category	Responses Fail QC																N/A	#DIV/0!	80	#DIV/0!	
49																								
50																								
51																								
52																								
53																								
54																								
55																								
56																								

Reach Scoring Sheet | Point Scoring Sheet

Ready | Accessibility: Good to go | 65%

Standard Operating Procedures for Using RSA Data Collection Tools

District Department of Energy and Environment
Natural Resource Administration
Water Quality Division

Download/Update Apps

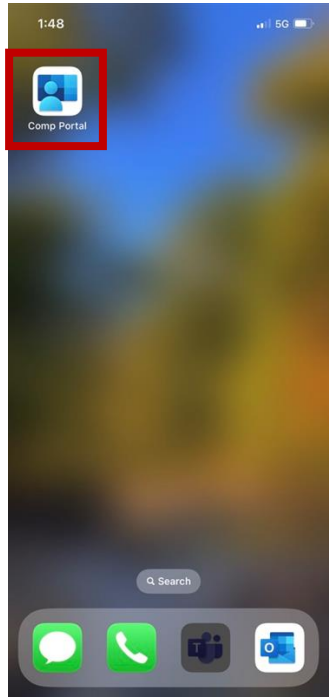
FieldMaps and Survey123 must be downloaded on your tablet or mobile device to conduct Rapid Stream Assessments. Staff should routinely (~monthly) check for and accept available app updates.

On DC Gov Devices*

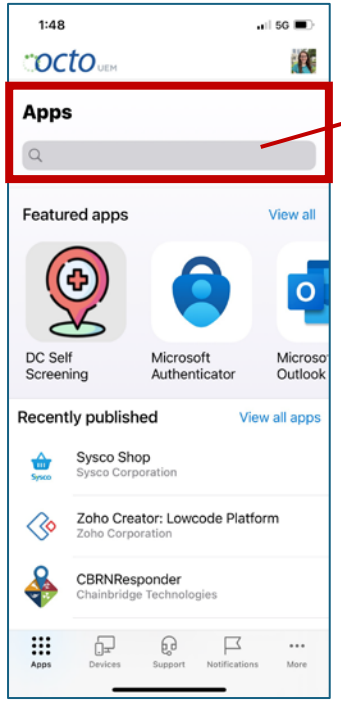
1. Tap the “Comp Portal” icon and sign in with your DC Gov credentials
2. Using the search bar, search for “ESRI”
3. Tap ‘ArcGIS Field Maps’ then ‘install’ or ‘update’, as applicable
4. Return to search results
5. Tap ‘ArcGIS Survey123’ then ‘install’ or ‘update’, as applicable

**If not using a DC gov device, install Apps through the Apple ‘App Store’ or ‘Google Play Store’*

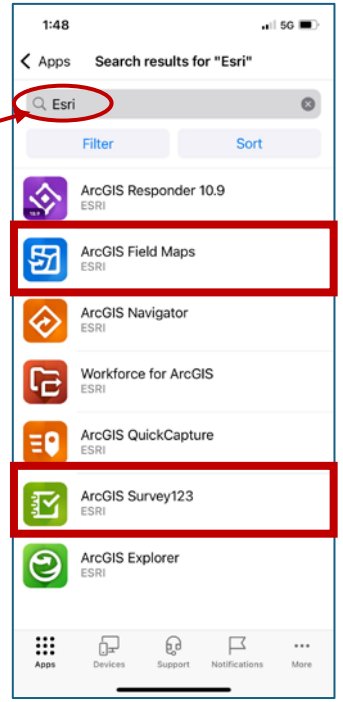
Step 1



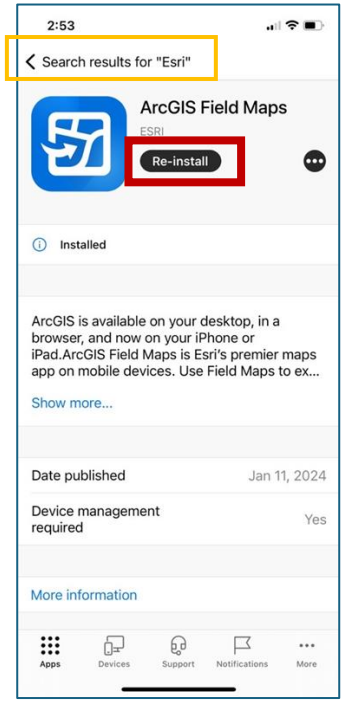
Step 2



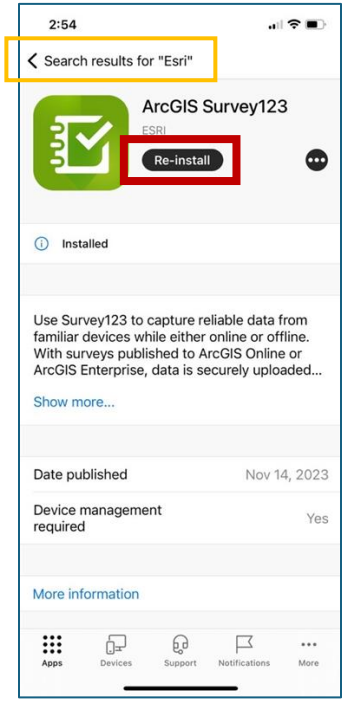
Steps 3-5



Step 3-4



Step 5



Note Regarding Steps 3 & 5:
If the app is already installed and there are no updates, it will say ‘re-install’. No action is needed.

DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

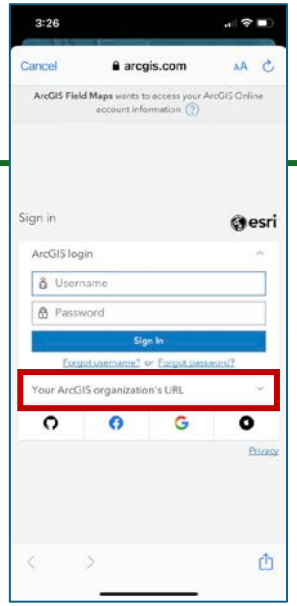
Getting Started

Field Maps

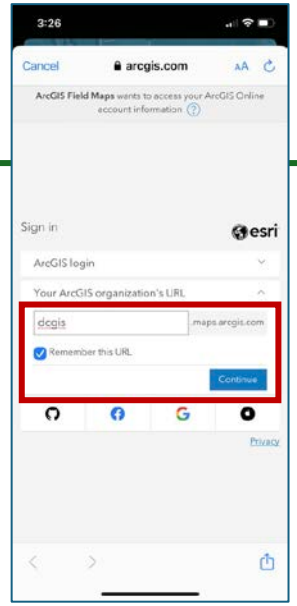
1. Tap ‘Field Maps’ icon to launch app.
2. Tap ‘Sign in with ArcGIS Online’
   a. Tap ‘Your ArcGIS organization’s URL’
   b. Enter ‘dcgis’ into the box so that the full url reads ‘dcgis.maps.arcgis.com’
   c. Check ‘Rember this URL’ (optional)
   d. Tap ‘Continue’. A banner that says, DC GOV LOGIN should then appear.
   e. Click ‘DC GOV LOGIN’ and follow prompts to sign in using your DC Gov credentials.
3. Tap the ‘User’ icon in the upper right corner to open your profile.
4. Tap ‘Collector Settings’ and verify ‘Photo Upload Size’.
   a. If ‘Photo Upload Size’ says ‘Extra Large’ or ‘Actual’:
      i. Tap ‘back’
      ii. Tap ‘Done’
   b. If the ‘Photo Upload Size’ does NOT say ‘Extra Large’ or ‘Actual’:
      i. Tap ‘Photo Upload Size’
      ii. Tap ‘Extra Large’ or ‘Actual’
      iii. Tap ‘back’ then ‘Done’
5. Using the search bar, search for ‘RSA’ and tap the appropriate map to open.
   a. Map name may vary by field season but will typically be called something like RSA_{YEAR}.
   b. Contact RSA Program Lead or one of the RSA Field Team Leads if you need help identifying the correct map.

Step 1 & 2

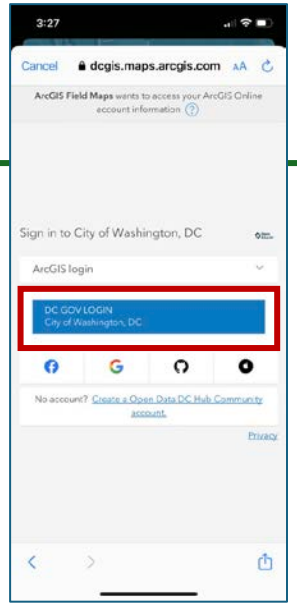
Step 2a



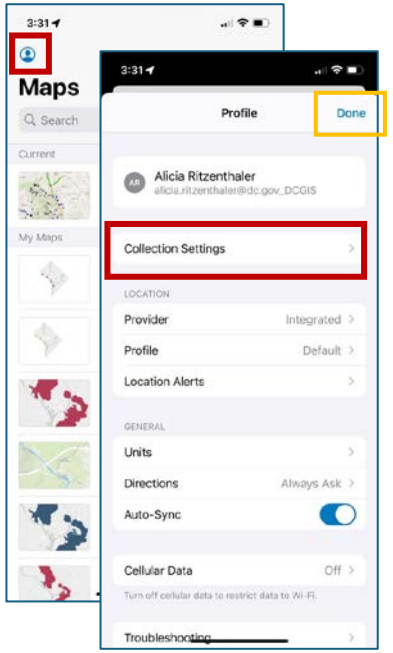
Step 2b, 2c, and 2d



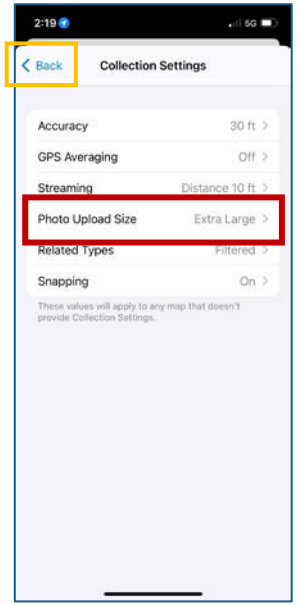
Step 2d and 2e



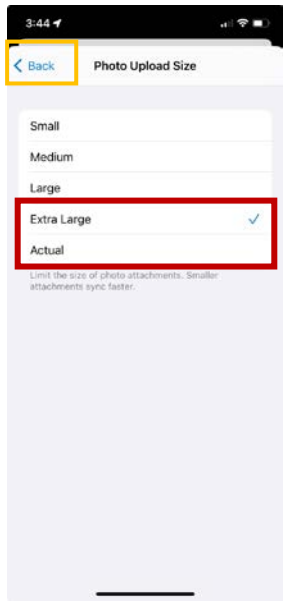
Steps 3 & 4



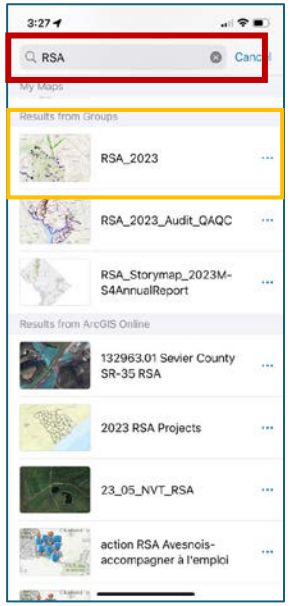
Steps 4a and 4b



Step 4b



Step 5



DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

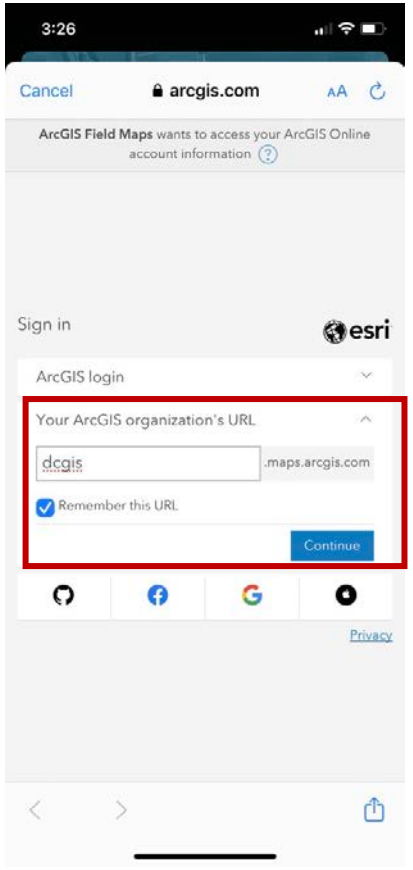
Getting Started

Survey 123

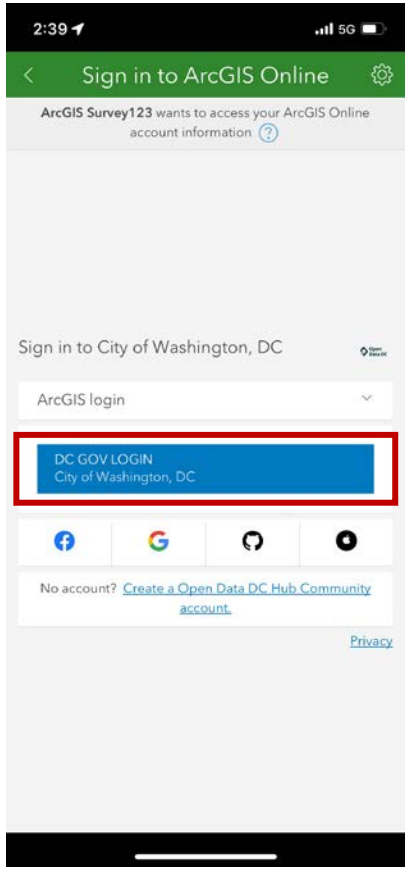
1. Tap the ‘Survey 123’ icon to launch app.
2. Tap ‘Sign in with ArcGIS Online’
   a. Tap ‘Your ArcGIS organization’s URL’
   b. Enter ‘dcgis’ into the box so that the full url reads ‘dcgis.maps.arcgis.com’
   c. Check ‘Rember this URL’ (optional)
   d. Tap ‘Continue’. A banner that says, DC GOV LOGIN should then appear.
   e. Click ‘DC GOV LOGIN’ and follow prompts to sign in using your DC Gov credentials.

Step 1 & 2

Steps 2a - 2d



Steps 2d - 2e



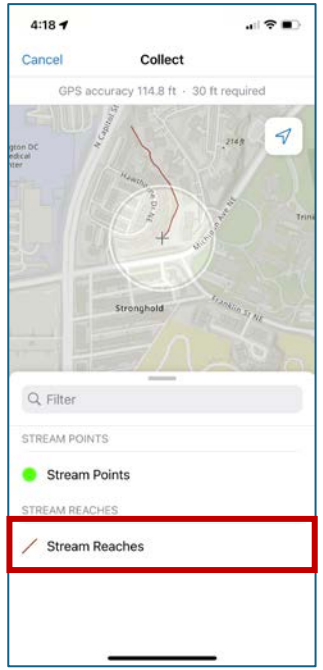
ArcGIS Field Maps

Creating New Stream Reaches

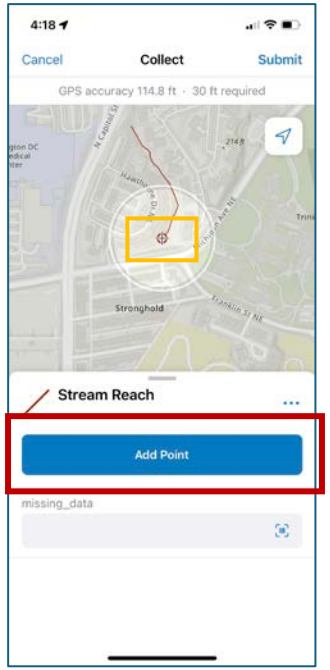
1. Tap '+' icon to start creating a new feature.
2. Tap 'Stream Reaches' to start creating a new stream reach.
3. Drag the map with your finger so that the '+' is at the starting location of the new stream reach you'd like to draw.
4. Tap 'Add Point'
5. Drag the map again with your finger so that the '+' is at the next vertices' of your stream reach. You'll probably be following an existing stream reference line but you don't need to if the stream does not actually follow the reference.
6. Tap 'Add Point'
7. Repeat Steps 5-6 until you've drawn your entire stream reach.
8. Tap 'Submit'

Step 1

Step 2

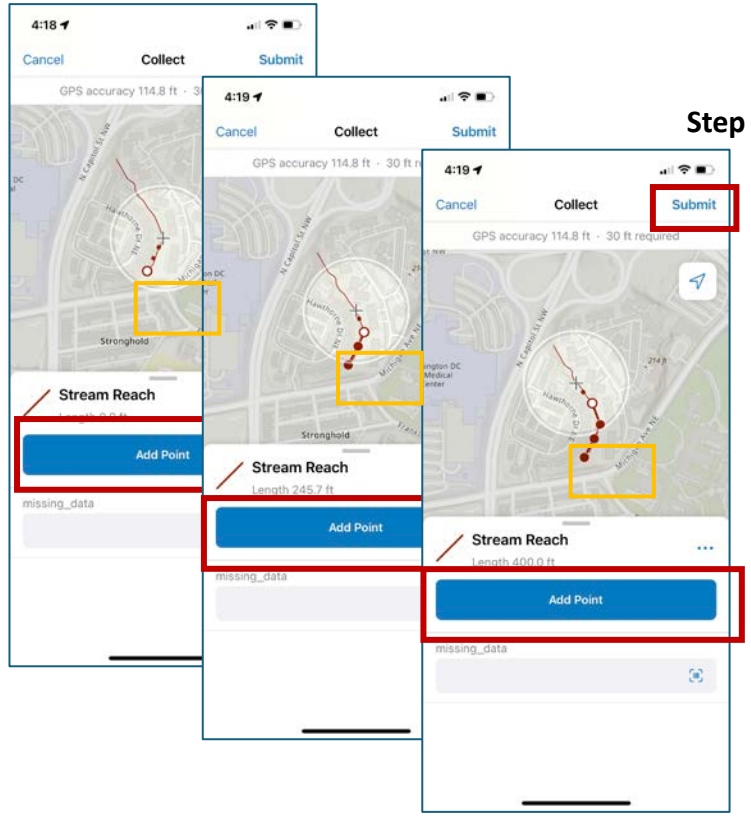


Steps 3-4



Steps 5-7

Step 8



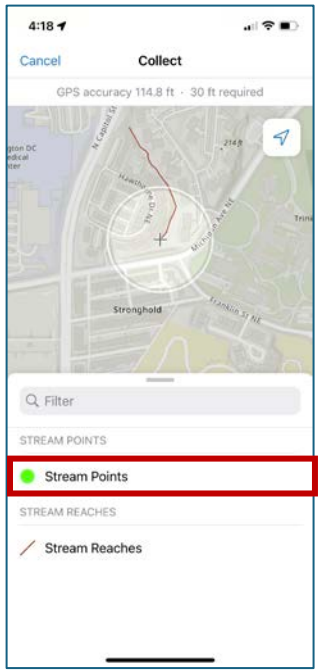
ArcGIS Field Maps

Creating New Point Features

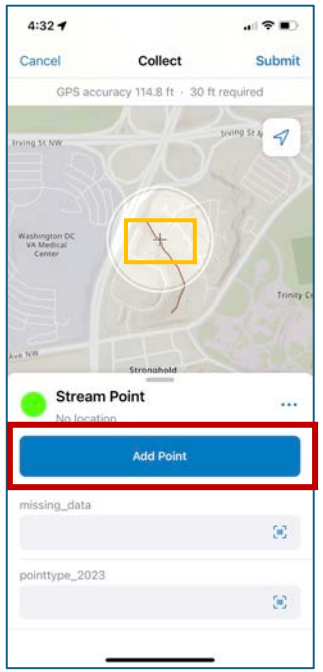
1. Tap '+' icon to start creating a new feature.
2. Tap 'Stream Points' to start creating a new point feature.
3. Drag the map with your finger so that the '+' is at the location of the point feature you plan to assess.
4. Tap 'Add Point'
5. Review the points location.
   a. If satisfied:
      - Proceed to step 6
   b. If NOT satisfied:
      a. Repeat Step 3-5
6. Tap 'Submit'

Step 1

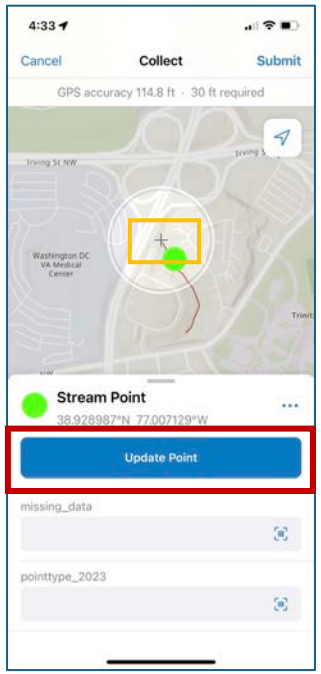
Step 2



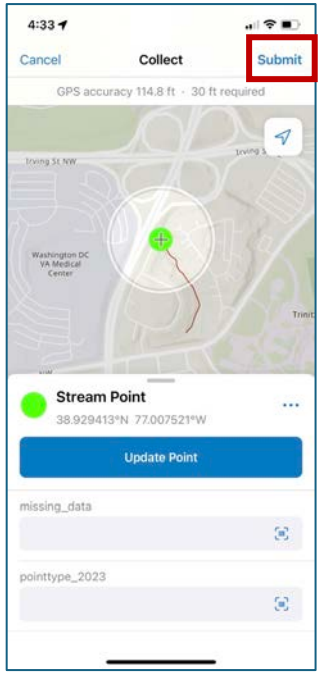
Step 3-4



Steps 5



Step 6



DEPARTMENT OF ENERGY & ENVIRONMENT
GOVERNMENT OF THE DISTRICT OF COLUMBIA

ArcGIS Field Maps

Editing Existing Stream Reaches

1. Tap the stream reach you'd like to edit to select it. Once selected it will be highlighted a bright teal color.
2. With your stream reach selected, tap the pencil/edit icon along the bottom banner.

A. To Extend the length of the stream reach:

3. Drag map with your finger to place center of target where you'd like to place your new vertices.
4. Tap 'Add Point'
5. Repeat steps 3a-3b until edits are complete. Then tap 'Submit'

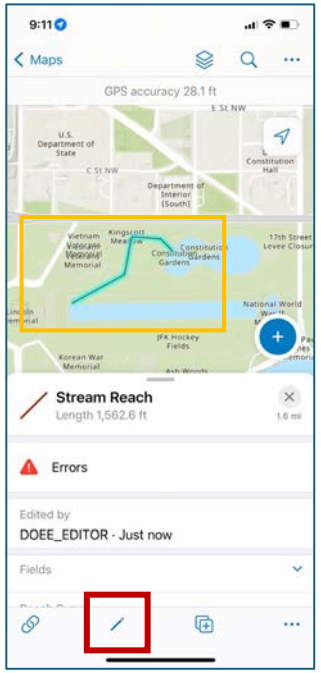
B. To Edit the location of an existing stream vertice:

3. Tap the vertice you want to relocate to select it. It will be highlighted white once selected.
4. Drag map with your finger to place center of target where you'd like to relocate the vertices to.
5. Tap the more options icon (three dots) then tap 'update selected point'
6. Repeat steps 4a-4c until all edits are complete. Then tab 'submit'.

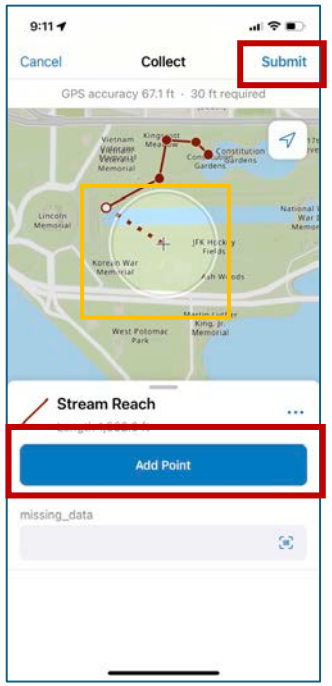
C. To Delete an existing stream vertice

3. Tap the vertice you want to delete to select it. It will be highlighted white once selected.
4. Tap the more options icon (three dots) then tap 'Delete selected point'
5. Repeat steps 5a-5b until all edits are complete. Then tab 'submit'.

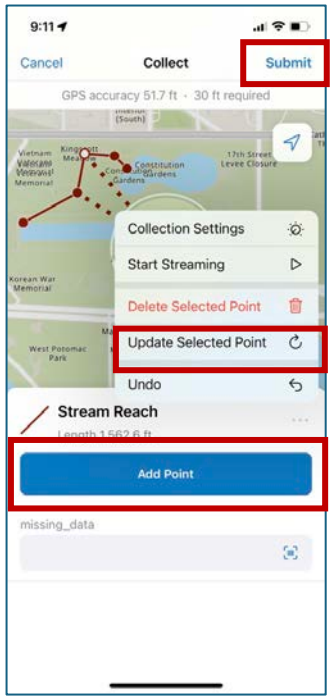
Steps 1 and 2



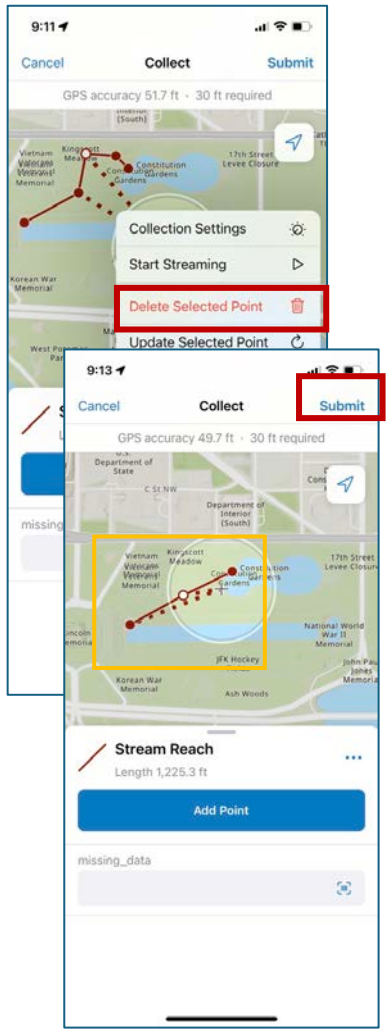
Step A, 3-5



Steps B, 3-6



Steps C, 3-5



DEPARTMENT OF ENERGY & ENVIRONMENT
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ArcGIS Field Maps

Editing Existing Point Features

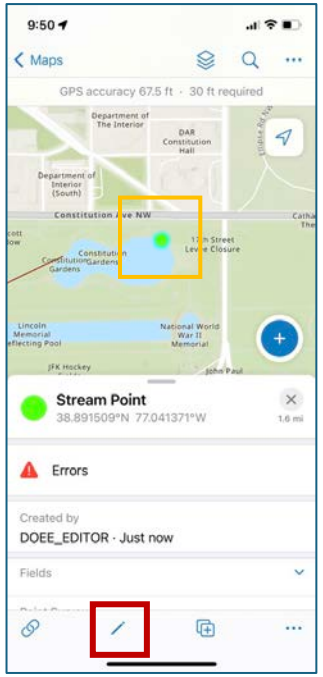
To Edit the Location of Existing Point Features:

1. Tap the point feature you'd like to edit to select it. Once selected it will be highlighted a bright teal color.
2. With your point feature selected, tap the pencil/edit icon along the bottom banner.
3. Drag map with your finger to place center of target where you'd like to place your new vertices.
4. Tap 'Add Point'
5. Repeat steps 1-4 until edits are complete. Then tap 'Submit'

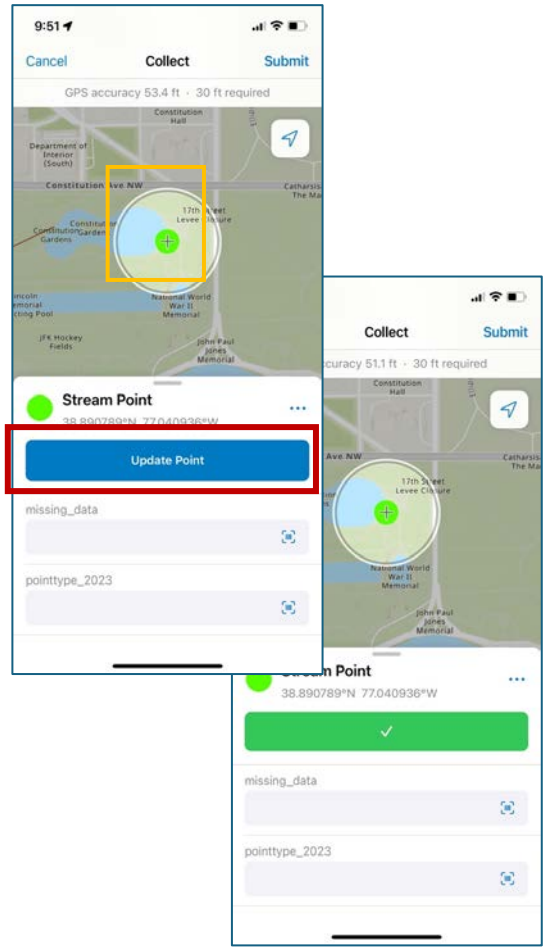
Do NOT delete point features!

If the point no longer exists complete an RSA Point Assessment to reflect these new conditions instead of deleting the point. Answer 'yes' when asked if the point has changed then use 'does not exist' assessment type.

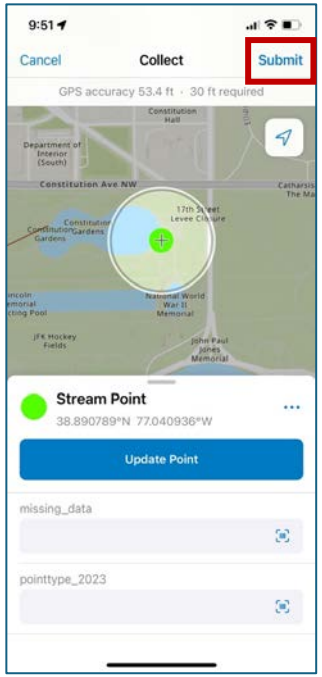
Steps 1 and 2



Step 3 and 4



Step 5

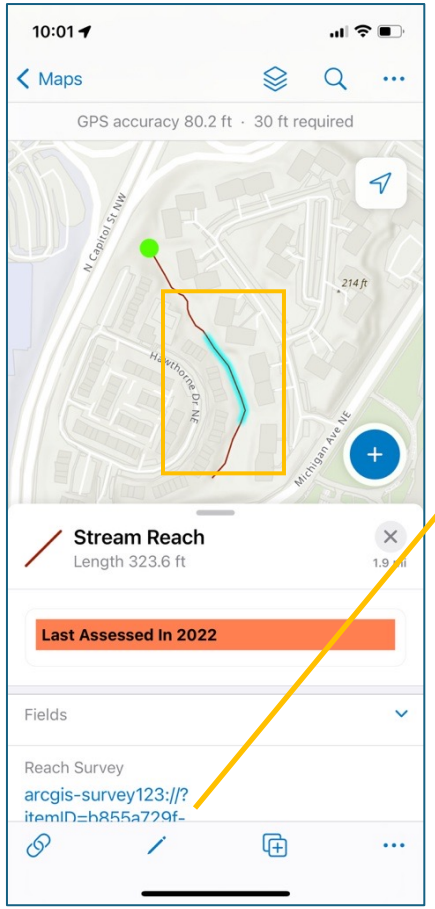


ArcGIS Field Maps

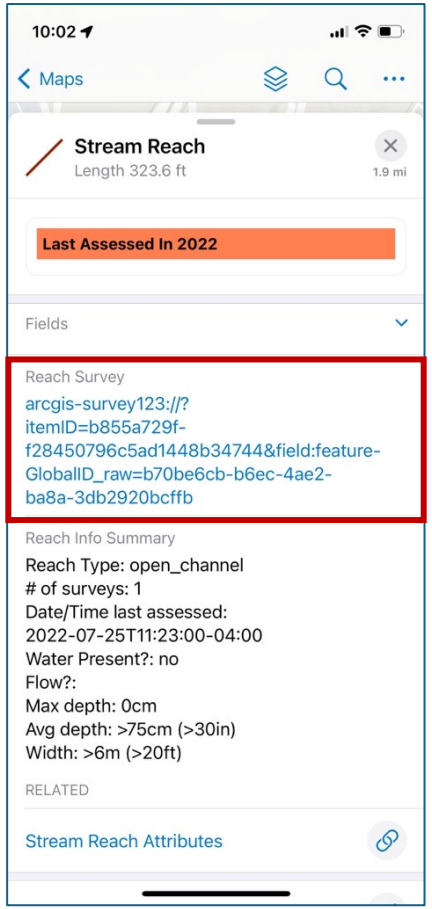
Completing a Stream Reach Assessment

1. Tap the stream reach you'd like to assess to select it. Once selected it will be highlighted a bright teal color.
2. Click on the Reach Survey Hyperlink. If not visible, expand the content page by swiping up.
3. Complete the survey which opens in Survey 123 and tap the checkmark when complete to submit the survey.

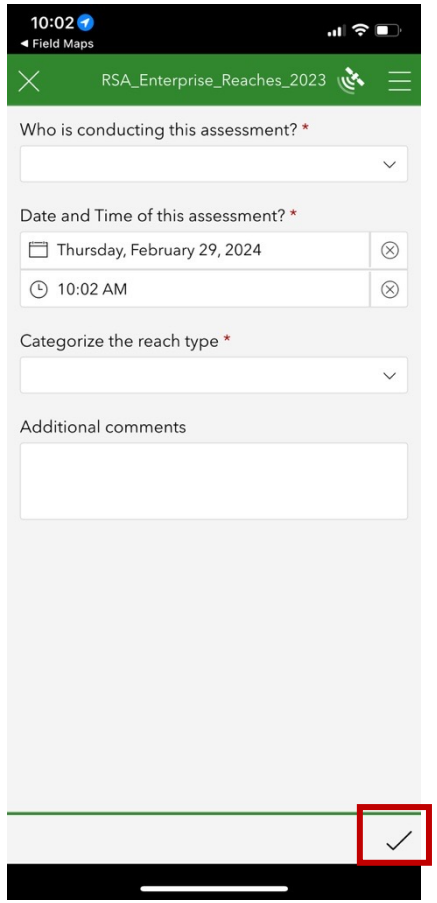
Step 1



Step 2



Steps 3

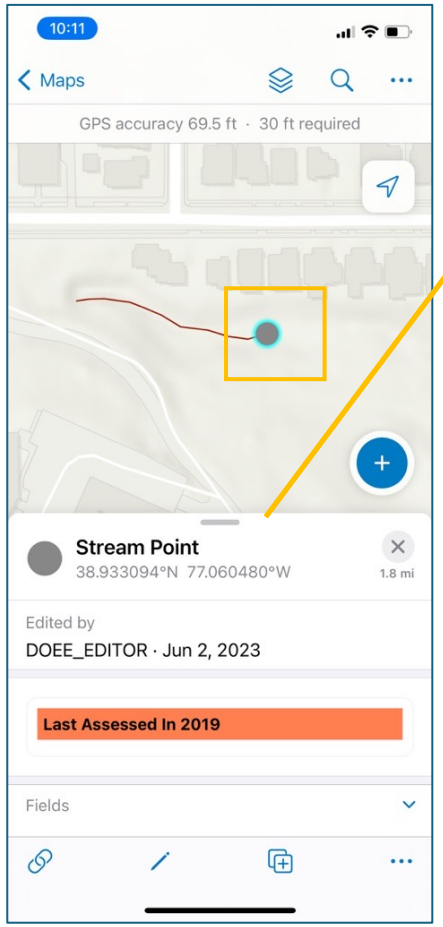


ArcGIS Field Maps

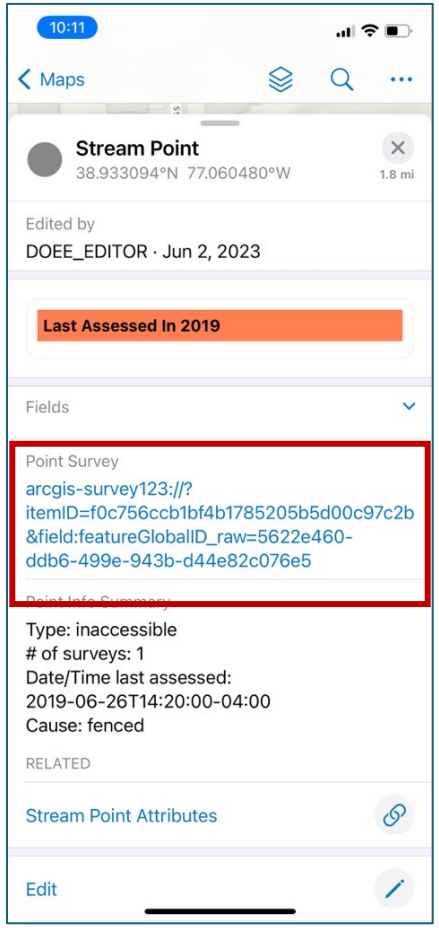
Completing a Point Assessment

1. Tap the point feature you'd like to assess to select it. Once selected it will be highlighted a bright teal color.
2. Click on the Point Survey Hyperlink. If not visible, expand the content page by swiping up.
3. Complete the survey which opens in Survey 123 and tap the checkmark when complete to submit the survey.

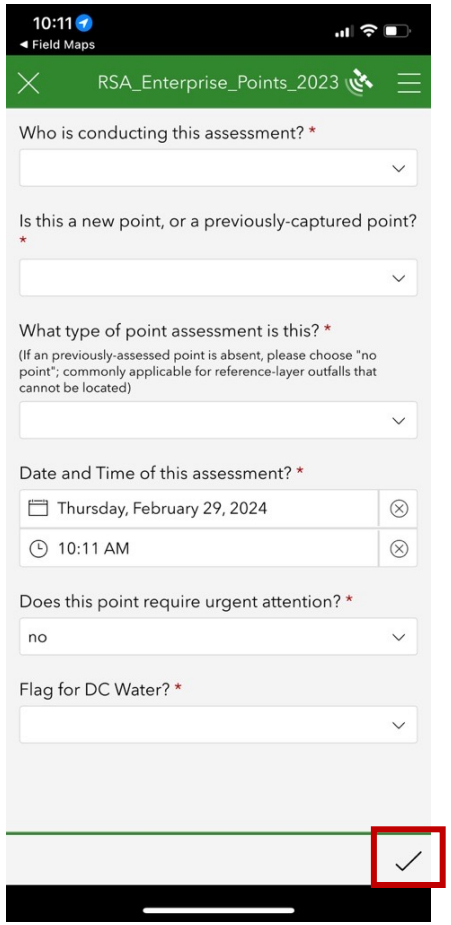
Step 1



Step 2



Steps 3



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