GROUP A. PROJECT MANAGEMENT

A.1 Title and Approval Sheet

Quality Assurance Project Plan

Post Fire Rehabilitation of the Rio en Medio

Submitted by:
Steve Vrooman, Project Manager and Coordinator
New Mexico Environment Department

Surface Water Quality Bureau

APPROVAL SIGNATURES

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Acronyms

BMP	
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EPA	United States Environmental Protection Agency
HEC-RAS	Hydrologic Engineering Center River Analysis System
KRE	Keystone Restoration Ecology
LIDAR	Light Detection and Ranging
NCD	Natural Channel Design
NMED	New Mexico Environment Department
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
SFNF	United States Department of Agriculture Forest Service Santa Fe National Forest
STEPL	Spreadsheet Tool for Estimation Pollutant Loads
SOP	Standard Operating Procedures
SWQB	Surface Water Quality Bureau

A3. Distribution List

Table 1. below contains the distribution list, project roles and responsibilities for this project. The QA Officer will ensure that copies of this QAPP and any subsequent revisions are distributed to members who have signature authority to approve this QAPP. The SWQB Project Officer will ensure that copies of the approved QAPP and any subsequent revisions are distributed to all other project personnel listed in Table 1. All members of the distribution list who do not have signature authority to approve this QAPP will review the QAPP and sign the Acknowledgment Statement prior to initiating any work for this project. The signed Acknowledgement Statements will be collected by the SWQB Project Officer and will be given to the QA Officer for filing with the official, approved QAPP.

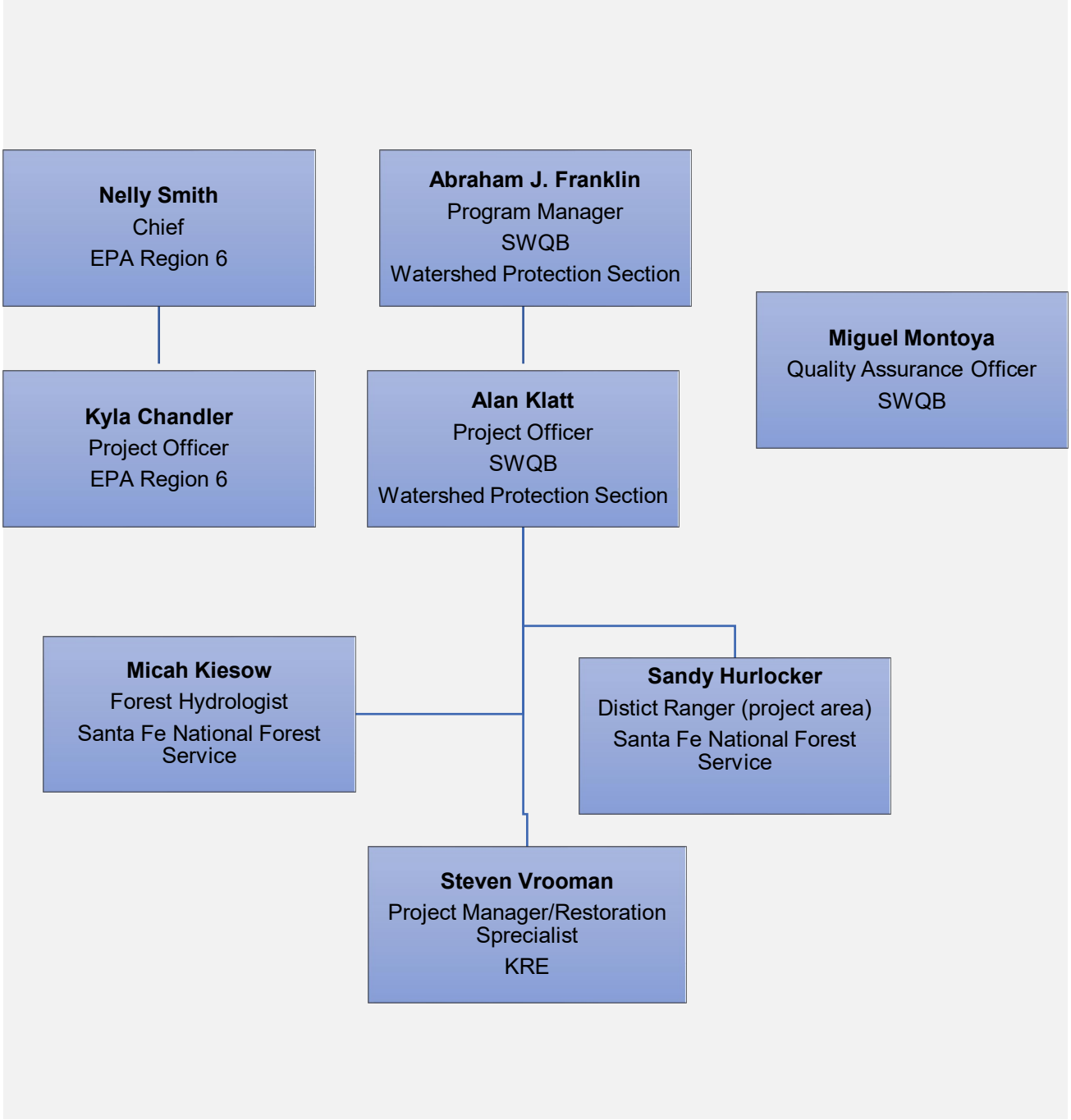
Table 1 Distribution list, Project Roles, and Responsibilities

Name	Organization	Title/Role	Responsibility	Contact Information
Abraham J. Franklin	SWQB	Program Manager	Reviewing and approving QAPP, managing project personnel and resources	505-946-8952 abraham.franklin@state.nm.us
Miguel Montoya	SWQB	QA Officer	Reviewing and approving QAPP	505.819.9882 miguel.montoya@state.nm.us
Alan Klatt	SWQB	Project Officer	Preparing and revising QAPP, distribution of QAPP, project reporting, coordinating with contractors and project oversight, oversight of data collection, and EPA reporting	505.819.9623 alan.klatt@state.nm.us
Steve Vrooman	KRE	Project Coordinator and Manager	Project oversight, data management, submittal of quarterly reports	505.490.0594 stevevrooman@gmail.com
Sandy Hurlocker	SFNF	District Ranger (in the project area)	Coordinating components of the project including—NEPA compliance, public notification, and review of construction documents (as needed).	505.753.7331 sandy.hurlocker@usda.gov
Micah Kiesow	SFNF	Forest Hydrologist	Will be kept apprised of project progress and will have a chance to review design plans prior to their finalization.	505.438.5433 micah.kiesow@usda.gov
Steve Vrooman	KRE	Watershed Restoration Specialist	Project design, implementation and construction oversight	505.490.0594 stevevrooman@gmail.com
Kyla Chandler	EPA	Environmental Protection Specialist WQPD, Region 6	Reviewing and approving QAPP	214.665.2166 chandler.kyla@epa.gov
Nelly Smith	EPA	Chief, State and Tribal Programs Section WQPD, Region 6	Reviewing and approving QAPP	214.665.7109 smith.nelly@epa.gov

A.4 Project Organization

The SWQB Quality Management Plan (NMED/SWQB 2021) documents the independence of the Quality Assurance Officer (QAO) from this project. The QAO is responsible for maintaining the official approved QAPP. Figure 1 presents the organizational structure for the "Post Fire Rehabilitation of the Rio en Medio" referred to in this document as the "Rio en Medio Project."

Figure 1. Organization Chart



A.5 Problem Definition /Background

This QAPP refers to the project as “Rio en Medio Project”. The goal of the project is to prevent extreme amounts of erosion of ash and soil from flowing into the Rio en Medio post fire before the onset of summer monsoons. The project is being managed by Keystone Restoration Ecology (KRE). The purpose of this Quality Assurance Project Plan (QAPP) is to is to ensure valid and defensible data is used to develop a restorations design, and to document procedures used to determine the effectiveness of restoration structures for the reduction of sedimentation (ash and soil) into the Rio en Medio.

Background

The Rio en Medio is a small tributary in Santa Fe County in northern New Mexico with headwaters in the Sangre de Cristo mountains, near Lake Peak at around 11,102 feet in elevation. The Rio en Medio flows into the Pojoaque River which meets the Rio Grande on the San Ildefonso Pueblo. The small community of Rio en Medio is located along the creek downstream of the burned area.

The Rio en Medio (Aspen Ranch to Headwaters), was sampled by the SWQB Monitoring Team as part of the Upper Rio Grande (URG) 2017-2018 field survey. One of three acute total recoverable aluminum samples collected exceeded the water quality standards, and physical habitat data showed an exceedance of the sedimentation threshold, which resulted in a listing for sedimentation. Aluminum was also added as a parameter of concern in the 2020-2022 State of New Mexico Clean Water 303(d)/305(b) Integrated Report. The Rio en Medio (non-pueblo lands Pojoaque River to Aspen Ranch) was also sampled as part of URG 2017-2018 field survey, and no impairments were found. As detailed in Water Quality Standards for Interstate and Intrastate Surface Waters 20.6.4 New Mexico Administrative Code designated uses include domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat, primary contact, and public water supply.

The Medio Fire began on August 17, 2020 on the Española Ranger District in the Sangre de Cristo Mountains above the Villages of Tesuque, Rio en Medio and Chupadero. The fire was started by a natural ignition and burned a total of 4,010 acres. The fire burned between 7,200 and 9,500 feet on steep rocky soils and was managed with a full suppression strategy. The fire burned in a mosaic of severity, with roughly 600 acres of high severity, mostly on north-facing slopes of mixed conifer.

Figure 2. Rio en Medio Burn area

Objective

The goal of the project is to prevent extreme amounts of erosion of ash and soil from flowing into the Rio en Medio that could result following a fire and a rainstorm event. As of now, an intense rain event has not yet occurred on the project area; therefore, the proposed designs are intended to be implemented pre-flood, in order to maximize its effectiveness and prevent erosion before it begins. After 1 or 2 post-fire flood events of great magnitude, gullying will be initiated, and the prevention of erosion becomes more difficult. A pre-fire erosion prevention design is intended to maintain the landform, promote flooding on the floodplains and alluvial fans, and prevent degradation of channels.

Figure 3. Burned Drainage to Rio en Medio

A.6 Project/Task Description

Description

The Project intends to develop a restoration design that will reduce sediment loading (ash and soil) from headcuts and unstable streambanks within the Rio en Medio caused by the recent fire and improve access to the Rio en Medio floodplain to improve riparian health. With improved access to the floodplain the riparian corridor will be maintained and improved resulting in increased water storage, pollutant filtration and habitat. The project consists of collecting topographic data which will include surveying channel cross-sections and longitudinal profiles in the development of a design using "natural channel design" methods. The focus of the restoration design will be to promote flooding onto floodplains and alluvial fans and to prevent degradation of channels and head-cutting upstream (grade stabilization). The data acquisition for restoration design and data collection to assess the effectiveness of restoration structures will be elaborated in more detail in Data Generation and Acquisition section B1.

Implementation of the restoration design, including installation of erosion control structures by KRE before a significant rain fall event will lead to water quality improvements in the future from the capture of sediment (ash and soil) from headcuts and unstable streambanks and promotion of flooding onto floodplain within the Rio en Medio which resulted from the fire. Additional water quality improvements will be realized by addressing sediment sources from the fire-impacted tributaries and road drainages that enter Rio en Medio within the project area as well. Although the Rio en Medio has not been determined to be impaired due to nutrients, the proposed structures will help maintain this level of water quality in the long-term.

The KRE will be responsible for monitoring improvements to water quality and demonstrating successful implementation of the proposed restoration design, the monitoring components are discussed in the Data Generation and Acquisition section. The gully and streambank erosion worksheet within the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) was used to produce a rough estimate that the project may reduce sediment loading by almost 200 tons/yr., at least in the first few years. Detailed load reductions will be calculated by the SWQB Project Officer after project implementation using STEPL annually. The model STEPL itself has been validated and verified as a model and is widely accepted and used by Federal and State agencies.

A field assessment and analysis of stream and watershed condition, sediment inputs, for restoration design will be completed by KRE by Summer, 2021 (task 1 in approved work plan). The data collected in the field assessment and analysis will be used to develop a restoration design including treatment type, location and material quantities needed. Data from field assessment and analysis will be used by Natural Channel Design (NCD) for calculations of appropriate size rocks for structure implementation.

Monitoring parameters for effectiveness of restoration design and structures integrity will utilize photo-documentation points which will confirm physical changes to stream morphology and success of the structure implementation. Several structures throughout the project will be monitored to ensure that they are functioning as designed and not in need of repair. These structures will be monitored as part of the photo-documentation effort but will also be inspected to assure that no excessive erosion or failure of key structural members has occurred or is imminent. Notes (field notebook or field sheets) will be made to describe the condition of the structures and any proposed maintenance tasks, which will be included in the annual photo monitoring report. As a benchmark used for reporting any noticeable change in structural integrity that is significant enough to warrant further evaluation or change in structure function will be reported to the SWQB Project Officer immediately. Locations of key structures to be monitored will be noted in the final design report.

Schedule

Task 1—Field assessment and analysis of stream and watershed condition)
KRE will travel to the site and conduct a project area-wide investigation over the course of one or several days. The project consists of collecting topographic data in the development of a design using a “natural channel design” methods. The focus of the restoration design will be to stabilize grade and promote flooding onto floodplains and alluvial fans to prevent degradation of channels and head-cutting upstream (grade stabilization). Topography will be measured with a laser level, and analyzed in conjunction with data from the USFS (soil types, burn severity maps, aerial imagery and LIDAR) to develop design drawings and rehabilitation plans.

NCD will provide analysis based on field data collected by KRE to determine the proper size of rock for structures under the new hydraulic regime. NCD will utilize the local channel slope and typical riffle cross section data and Wolman pebble count data to determine channel stage at a given design discharge (determined from BAER hydrology report) HecRAS 2d model with the planned structures. Critical shear stress will be calculated, and the largest particle moved during high flows will be calculated using equations developed from empirical data (Leopold, Wolman and Miller, 1964). If necessary, the shear stress calculations will include corrections for high sediment loads that can increase the weight of water and consequent shear stress development. These estimates of largest particle moved will be compared to existing particle sizes and utilized to determine the proper rock size in structures to resist

movement during high flows. Design will inform the necessary USACE 404 permitting which will be required prior to construction (Task 2).

Task 2—Implementation of rehabilitation plan and photo-documentation.
KRE will conduct photo-documentation post-implementation of restoration design beginning Summer 2021, and then again in Fall 2021 and Summer 2022. Photo-documentation will be accompanied by a narrative written report describing completed work, and an "as-built" document of restoration design will be submitted showing structure locations and type. Pending approval by NMED of the restoration plan produced under Task 1, Keystone Restoration Ecology will mobilize equipment and supplies to the project area to complete project restoration construction in spring 2021. Construction is expected to be completed within 30 working days with 2 machines at two project locations, one upstream near Aspen Ranch and the high-severity burn, one below the waterfalls near Rio en Medio Village to stabilize grade. In addition, a field crew (KRE and volunteers) will assist for two weeks to hand-build structures in selected sub-watersheds that suffered from high-severity fire.

Task 3—Follow-up site visit and repair structures as necessary
KRE will conduct photo-documentation Fall 2022 of structures implemented in restoration design. A narrative written report will accompany photo-documentation and will describe any damage to structures caused during any rain events and completed repair work.

KRE will return to the site after the summer monsoon season to assess and repair any damage to structures. This will involve a mobilization with two machines and oversight of the repairs/improvements to the structures. This task also includes follow-up monitoring for USACE 404 permit requirements and a final report

Table 2. Project Task, products, responsible party, timeline (use as applicable)

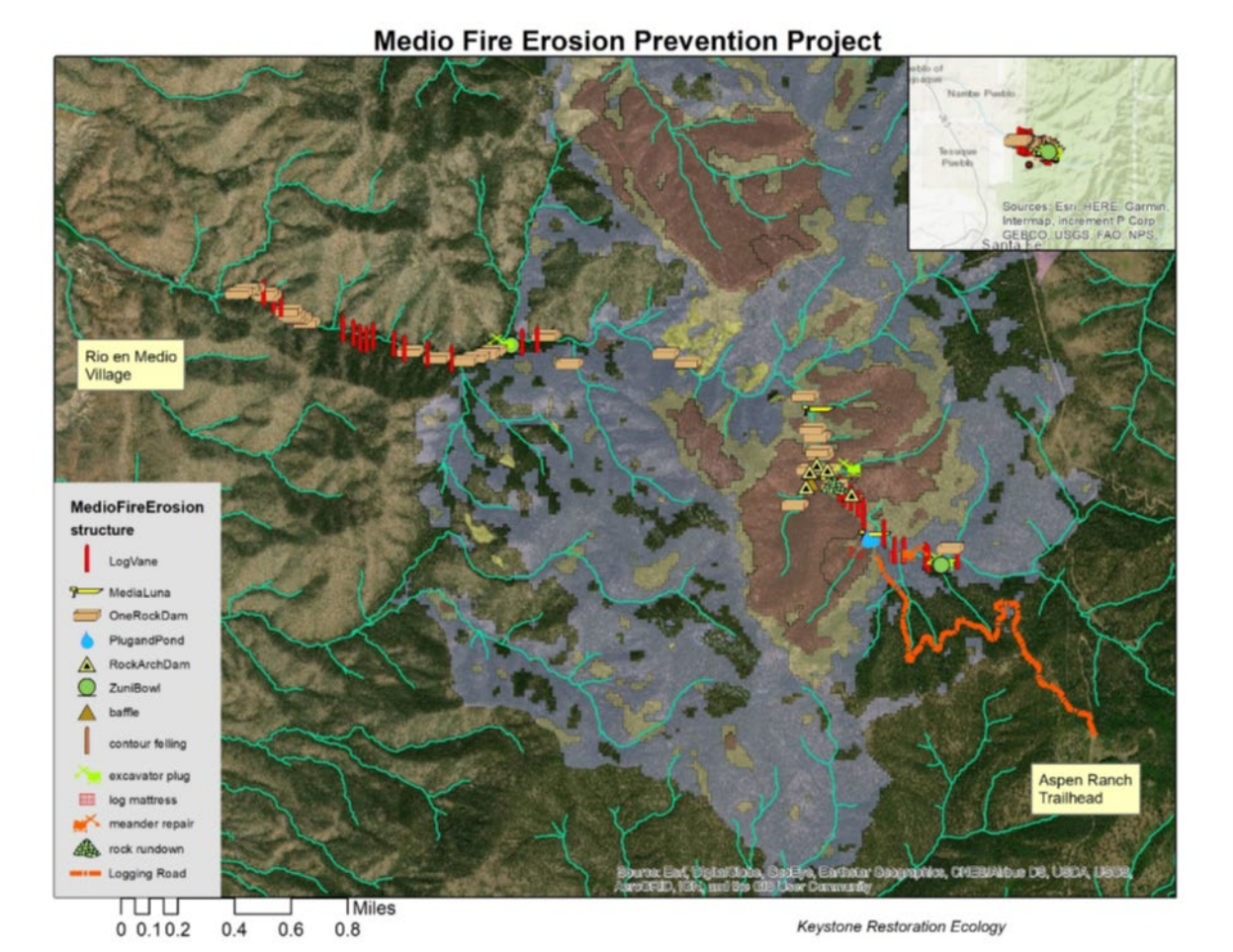
Task	Product	Responsible Party	Approximate State Date	Approximate Completion Date
Administrative	Procurement for contract	SWQB	January 2021	April 2021
Planning	Field site visit (no data collection)	SWQB, KRE, SFNF	May 2021	October 2021
Quality Assurance Project Plan	Approved QAPP	SWQB	March 2021	May 2021
Topographic Data	Field assessment with Measurements: cross section, longitudinal profile, and pebble count	KRE	May 2021	August 2021

Develop Restoration Design	Restoration Design	KRE	May 2021	August 2021
Implementation of Restoration Design	Restoration implementation	KRE	Spring-Fall 2021	Spring 2022
Restoration Structure Monitoring	Photo-documentation, "as-builts" showing structure type and location	KRE	Fall 2021	Summer 2022
Photo-documentation Reporting to SWQB Project Officer	Annual reporting including narrative written report	KRE	Fall 2021	Fall 2022
Reporting to EPA	Quarterly Reports, Annual Load Reduction Estimates, and Final Report to EPA	SWQB Project Officer	July 2021	Winter 2022

Project Area

The project area focuses on the creek in the highest burn severity area south of Aspen Ranch (~35.796240, -105.822720) and in the lower reach of the creek up stream of Rio en Medio (~35.824978, -105.864432). Work on the lower reach will cover approximately 2 miles of channel and the upper reach approximately a little over a mile. Work on the lower reach will be below the waterfalls near Rio en Medio Village to stabilize grade.

Figure 4. Rio en Medio with Potential Restoration Locations



Monitoring Location Selection Criteria

All the proposed treatment types and treatment locations are shown in Figure 4 above. Photo-documentation monitoring will be partially driven by the 404 permit. It is likely that key structures will require monitoring using photo-documentation during inspection to ensure that potential failure does not endanger key resources.

Restoration Activities

The project will be designed using commonly used “natural channel design” methods and will include the following erosional control and floodplain connecting structures: log vane, media luna, one rock dams, plug and pond, rock arch dam, zuni bowl, baffle, excavator plug, log mattress, meander repair, and rock rundown. Initial structure locations were identified in the channel of the Rio en Medio and four minor tributaries that suffered high-severity burns. The focus of these structures is to promote flooding onto floodplains and alluvial fans and to prevent degradation of channels and head-cutting upstream (grade stabilization).

A7. Quality Objectives and Criteria for Measurements

Question/Decision

The goal of the project is to prevent extreme amounts of erosion of ash and soil from flowing into the Rio en Medio. Water quality improvements will result from reduced sediment loading from headcuts and unstable streambanks within the Rio en Medio after implementation of restoration design.

The data collection and monitoring components of the "Rio en Medio Project" are intended for use in the following:

1) Develop a restoration design and;
2) Monitor the effectiveness of restoration implementation.

Stated as a decision: 1) The information gathered as part of the field assessment will be used in development of a restoration design and; 2) the photo-documentation will be used to determine restoration implementation effectiveness.

Data Quality Objective (DQO)
The quality of the data will be adequate to provide a high level of confidence in development of restoration design for the "Rio en Medio Project" and to determine restoration implementation effectiveness.

Data Quality Indicators
The measurement quality objectives will be sufficient to achieve the DQO and will be in conformance with those listed in the SWQB's QAPP. The Data Quality Indicators listed in the SWQB's QAPP and applicable to the data collected for this project are precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity.

DQI	Determination Methodologies
Precision	will be ensured by following the procedures identified in this QAPP and having two monitoring participants present during all data collection activities.
Bias	the basis for determining accuracy will be staff's expertise of the survey method for collecting data and ensuring the accuracy of the equipment being used is within the required range of a particular survey
Accuracy	Location of photo sites will be monumented so that photos-documentation is consistent and repeatable.
Representative	pre-treatment topographic data sites will be determined by areas anticipated to be most susceptible to erosion and ash runoff caused by rain events. Photo-documentation will be collected a restoration implementation sites.
Comparability	monitoring locations in restoration implementation sites will be monumented for repeat sampling events to compare photo-documentation data. Methods

	listed under this QAPP for data collection are standardized and reproducible with the intent to be comparable to other studies.
Completeness	surveys and methodologies will be completed in their entirety as identified in this QAPP.
Sensitivity	Sensitivity of metrics used will be analyzed during analysis and recalibration of data and instruments.

A.8 Special Training/Certification

No special training is required for this project. Documented experience as identified below replaces any training required for the project. This project will be primarily implemented by Steve Vrooman of KRE, also president of KRE, a Santa Fe, New Mexico consulting firm founded in 2001. KRE specializes in the ecosystem restoration of natural and man-made landscapes using the sciences of ecology and geomorphology. Mr. Vrooman along with his associates of KRE have extensive experience in watershed assessment, water-harvesting road design, stream and wetlands restoration, and rangelands monitoring in New Mexico, Colorado, Arizona, and Texas. KRE is composed of practitioners of Induced Meandering and Natural Channel Design methods and is in good standings with NMED SWQB.

Steven Vrooman has worked throughout the southwest with an emphasis on high desert environmental restoration of riparian and upland ecosystems. He has as BS in Biology from New Mexico Tech and MS in Biology from University of Nevada specializing in plant community ecology. Data collection and monitoring for this project will be implemented by Steve Vrooman of KRE with technical assistance and oversight from the SWQB Project Officer and SFNF. Volunteers will be supervised by Steve Vrooman while conducting work for the project. Individual employed by Steve Vrooman conducting work for the project will review this QAPP and sign the acknowledgment statement prior to initiating any work for the project.

A.9 Documents and Records

The SWQB Project Officer will make copies of this approved QAPP and any subsequent revisions available to all individuals on the distribution list who do not have signature authority for approving the QAPP. When changes affect the scope, implementation, or assessment of the outcome, this QAPP will be revised to keep project information current. The SWQB Project Officer, with the assistance of the QAO, will determine the effects of any changes to the scope, implementation, or assessment of the outcome on the technical and quality objectives of the project. This Project Plan will be reviewed annually by the SWQB Project Officer to determine the need for revision.

Project documents include this QAPP, field notebooks, calibration records, validation and verification records, and recorded field data. Also included are project reports. Data captured on a global positioning system (GPS), camera, smart phone, tablet, or laptop will be downloaded to a KRE computer or an external hard drive at the end of each day. Copies will be made of all data and stored separately from the original data.

All digital project data will be kept in a project file on a KRE computer and on a separate external backup hard drive at the KRE office. Hard copy project documents will be kept in a project folder in a file cabinet at the KRE office. All hard copy documents will be digitized and stored on a KRE computers and backup on a hard drive (see Table 4). Copies of the data will be distributed by Steve Vrooman to NMED SWQB Project Officer after each filed season, typically at the end of November. Electronic data files will be stored on the SWQB network drive in accordance with 1.21.2 NMAC, *Retention and Disposition of Public Records.*

Table 3. Data Records for the Project

Document	Type of Form	Storage Location	Field Sheet Used
QAPP	Electronic (.doc)	SWQB File depot.	EPA Requirements for Quality Assurance Project Plan. EPA QA/R-5.
Topographic field Data	Hard Copy	KRE	Field notebook
Photo-documentation	Electronic (.jpg)	KRE Computer backed up	Field Sheet and Table
Interim and Final Reports	Electronic (.doc) & Hard Copy	SWQB File Depot	NA

GROUP B: DATA GENERATION AND ACQUISITION

B1. Sampling Plan

Keystone Restoration Ecology will travel to the site and conduct a project area-wide (Figure 4) investigation (field assessment) over the course of one or several days. The field investigation will include data collection for topography, utilizing a laser level for measurements. The topographic data collected in the field assessment will be used to develop a restoration design and rehabilitation plan including treatment type, location and material quantities needed. The topographic data will be analyzed in conjunction with available data (soil types, burn severity maps, aerial and LIDAR imagery) for the project area provided by the USFS in development of design drawings and rehabilitation plan. Though the design and rehabilitation plan are not complete, KRE will utilize a “plug and pond” method for the design and rehabilitation plan. Implementation of the method will reduce sediment (ash and soil) from headcuts and unstable streambanks resulting from fire and promote flooding onto floodplain within the Rio en Medio. Erosion mitigating structures listed in Figure 4 of this QAPP are appropriate treatment options for addressing direct incision and headcuts cause by wildfire, off road vehicles, trailing, and logging (NMED/SWQB 2014). Figure 4 in the Project/Task Description Section identifies approximate location of restoration measures, locations were determined from initial visual assessment of burn areas with the SFNF and KRE. Exact location of restoration measures will determine monitoring locations. KRE will conduct all monitoring for the project. Photo-documentation will be conducted at restoration structures post-construction and will be used to document restoration structure effectiveness. Visual inspection of the watershed restoration measures (erosion control structures) will take place after major flood events and in the Summer 2021 and Fall (2021-2022) after summer monsoon runoff to assess and repair any damage to structures. Visual inspections will be documented with photo-documentation monitoring of each structure that includes multiple photos of structure type,

utilizing the method described in the next section. In addition, KRE will visually look at scour both below and on the sides of the structures and write notes on structure performance and any maintenance needs. The photo-documentation will also be used to demonstrate improvements to the USACOE for the 404 permit. If monitoring location become inaccessible and adaptive monitoring strategy will be implemented, if data gaps are identified.

Table 4. Project Monitoring Specifics

Responsible Party	Monitoring	Location	Frequency
KRE	Topographic data including: cross section, longitudinal profile, and pebble count	Project Area	pre-implementation of restoration
KRE	Photographic-documentation	Restoration locations including structures	Summer 2021, Fall 2021 and Fall 2022

Model calibration, verification, and validation for STEPL is not applicable to this project. Calibrating, verifying, and validating STEPL could potentially improve STEPL load reduction estimates; However, the time and budget and expertise, to calibrate, verify, and validate STEPL is not planned for this project. The trade-off of using a simple model like STEPL is that STEPL does not typically require calibration, verification, or validation – the model is easy to use and widely applicable given the broad assumptions of the model. The downside is greater uncertainty and error which is acceptable by the NMED SWQB for this type of project.

B2. Sampling Methods

Topographic data, including cross-section, longitudinal profile, and pebble count — will be conducted according to Leopold, L.B., Wolman, M.G., and Miller, J.P. (1964*).* Fluvial Processes in Geomorphology. W.H. Freeman and Company, San Francisco, CA.

Photo-documentation — Each key structure will be visually inspected during the photo-monitoring period. Inspections will take note of key structural elements and connections, aggradation or degradation of key elevations as well as structural function. Key elements will be photographed and reported with notes in the photo-monitoring document. All photo-documentation will be documented using Appendix A Photo-documentation Field Form. Table 5 Photo-documentation Filed Form (below) shows data attributes that will be recorded for each photo. Location of photo sites will be monumented so that photos-documentation is consistent and repeatable.

Table 5 Photo-Documentation Field Form

Photo Point # and Site Location	Northing (GPS location)	Easting (GPS location)	Description	Comments

STEPL — modeling will be completed in accordance with the instructions provided on the US EPA. STEPL inputs will come from the STEPL Input Data Server and will follow the U.S. EPA Guide for Using STEPL Online Data Access System (https://www.epa.gov/nps/guide-using-stepl-online-data-access-system).

STEPL output will be derived from the "Gully&Streambank" Spreadsheet and will require additional inputs such as gully width, gully depth, and gully length which will be estimated from field measurements using a laser level and tape measure. No other sampling collections methods are planned for STEPL load reduction estimates for this project.

B3. Sample Handling Custody

Because there are no plans to collect samples for laboratory analysis, there are no handling requirements.

B4. Analytical Methods

Because there are no plans to collect samples, no analytical methods are needed.

B5. Quality Control

Quality control (QC) activities are technical activities performed on a routine basis to quantify the variability that is inherent to any environmental data measurement activity. The purpose for conducting QC activities is to understand and incorporate the effects the variability may have in the decision-making process. Additionally, the results obtained from the QC analysis, or data quality assessment, may identify areas where the variability can be reduced or eliminated in future data collection efforts, thereby improving the overall quality of the project being implemented.

Quality Control mechanisms are implemented as described under the Quality Objectives and Criteria for Measurement Data as well as the sampling methodologies identified under this QAPP. Additional Quality Control includes the professional expertise of the personnel working under this project.

In order for the data to be defensible and usable, the project will be implemented by KRE who are experienced watershed restoration specialist and will ensure volunteers are properly trained before conducting any work for the project. Other actions that will assure the collection of quality data are listed below.

- Data will be recorded on forms that identify the location, date, and description of observations and recommendations (see Methods section of this QAPP)
- KRE personnel will be familiar with the general principles of repeat photography and specific requirements of this QAPP. Site maps, flagging, and GPS locations will ensure the monitoring sites are relocated by successive photo-documentation surveys.
- KRE personnel will be knowledgeable of the monitoring protocol for topographic surveying and will be able to identify changes to, or caused by, installed practices. Site maps, photos, monument pins, and GPS locations will ensure the monitoring sites are located by successive photo-documentation.
- The data will be recorded on specialized data sheets (see Methods section of this QAPP) and transferred to electronic spreadsheets for analysis.
- Annual report will be developed after each monitoring season
- The field data sheets, inspection forms and reports will be archived in by the KRE and sent to SWQB Project Officer.

B6. Instrument/Equipment Inspection and Maintenance

The Steve Vrooman of KRE is responsible for the inspecting of equipment and supplies (Table 6) before data collection. All field equipment will be inspected prior to each monitoring event. All instruments and

equipment will be tested, inspected and maintained in accordance with the manufacturer's specifications as included in the associated instrument/equipment manual.

Table 6. List of Equipment and Supplies

- Laser Level
- GPS
- Camera
- Tape Measure
- Computers
- Machinery

B7. Instrument/Equipment Calibration and Frequency

It should be possible to show that all topographic data was collected using equipment and accuracy as detailed in Table 7. Steve Vrooman will ensure laser level is calibrated to factory specifications before data collection. The laser level factory specification will be checked according to manufacture calibrations frequency. The GPS used to document photo-documentation will also be checked to ensure that it is still recoding data as described by manufacture specifications.

Table 7. Laser Level Specification

Make	Model	Accuracy
Leica Rugby	810	± 1.5 mm at 30 m and ± 1/16" at 100 ft

B8. Inspection/Acceptance for Supplies and Consumables

Steve Vrooman of KRE will be responsible for supplies and consumables. If there is reasonable evidence that the laser level, GPS or camera has been damaged or is not up to manufacture specification the equipment will not be used for the Project. There are no other supplies or consumables that could affect the quality of data related to this project.

B9. Non-direct Measurements

LIDAR will be used to aid in modeling of structure effectiveness by running a HecRAS 2d model with the planned structures before implementation of restoration design. The LiDAR, aerial imagery, topographic maps, soil maps, and burn severity maps are all USDA approved products and have undergone their QAQC process and are usable by the SWQB and their independent projects.

B10. Data Management

Steve Vrooman of KRE, will be responsible for data collection and management. All raw data will be traceable to monitoring event, data type, data collector, and kept in its original form and electronic format. All data (photo-documentation, and topographic) will be converted to electronic format, stored and backed up by Steve Vrooman. Hard copies of field sheets will be maintained in a project binder (or field notebook) organized by date and assessment type and stored in a filing cabinet in the office of KRE. Photo-documentation will utilize photo-documentation field form, attached as Appendix A to this QAPP.

Topographic data will be recorded in a standardized field notebook and transferred to Microsoft Excel upon completion of data collection each winter, or when reasonably possible.

Reports accompanied by photo-documentation will be sent to the SWQB Project Officer by approximately Fall 2021 and Fall 2022 by Steve Vrooman of KRE. Upon receiving reports and data, the SWQB Project will store data on SWQB network drive in project specific folder for the "Post fire Rehabilitation for Rio en Medio" Project. The SWQB network drive is backed up daily and maintained by the NMED Office of Information Technology. Electronic data files will be stored on the SWQB network drive in accordance with 1.21.2 NMAC, *Retention and Disposition of Public Records.*

GROUP C: ASSESSMENT AND OVERSIGHT

C1. Assessment and Response Actions

The SWQB Project Officer along with District Ranger and Forest Hydrologist for Santa Fe National Forest Service will provide project oversight by periodically assisting with and/or reviewing restoration efforts, which includes topographic data collection and analysis against non-direct measurements. A review of the restoration plan will be conducted by the SWQB Project Officer with assistance from USFS staff working on the project before implementation. The SWQB Project Officer will assess project progress to ensure the QAPP is being implemented, including periodic audits by the QAO, as needed. Any problems encountered during the course of this project will be immediately reported to the SWQB Project Officer who will consult with appropriate individuals to determine appropriate action. Should the corrective action impact the project or data quality, the SWQB Project Officer will alert the QAO. If it is discovered that monitoring methodologies must deviate from the approved QAPP, a revised QAPP must be approved before work can be continued. All problems and adjustments to the project plan will be documented in the project file and included in the final report.

C2. Reports to Management

Reports will be submitted by the Steve Vrooman of KRE, to the SWQB Project Officer and will include progress of project and any available data. Printouts, status reports or special reports for SWQB or EPA will be prepared upon request. The final report will be submitted to the SWQB Project Officer by Spring fall 2022. The SWQB Project Officer will be responsible for submitting the final project deliverables to EPA through their Grants Reporting Tracking System.

GROUP D: DATA VALIDATION AND USABILITY

D1. Data Review, Verification and Validation

Data will be reviewed by Steve Vrooman for erroneous data, incomplete data and transcription errors prior to demobilization from the field site. Data will be considered usable if the requirements of this QAPP were followed and the data is within acceptable range limits as defined under this QAPP. Data that appears incomplete or questionable for the parameter will be flagged for review. Flagged data will be discussed with the SWQB Project Officer and applicable USFS staff to determine the potential cause and usability before implementation of restoration design. If a reasonable justification for use of the

data cannot be attained, those data will be not used in analysis and implementation of activities listed under this QAPP unless the data can be recollected and assessed for usability.

D2. Validation and Verification Methods

The Steve Vrooman will ensure that valid and representative data are acquired. Verification and validation of data will occur daily after data collection (topographic data and photo-documentation). A verification and validation checklist will be used to document the verification and validation process. In the event questionable data are found, the SWQB Project Officer will notified and will consult appropriate personnel to determine the validity of the data. Results of the verification and validation process will be included in the final reports.

D3. Reconciliation with User Requirements

The user requirement is a restatement of the data quality objective: The quality of the data will be adequate to provide a high level of confidence in determining whether the *Post Fire Rehabilitation of the Rio en Medio* is meeting the project goals, as stated in the approved scope of work.

If the project's results do not meet this requirement, then additional monitoring may be necessary to fill in data, which may include an extension of the monitoring period to measure effects that were not apparent during the project period.

References:

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New Mexico Environment Department Surface Water Quality Bureau (NMED/SWQB). 2018. Quality Assurance Project Plan for Water Quality Management Programs. Available at: New Mexico https://www.env.nm.gov/surface-water-quality/protocols-and-planning/

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New Mexico Environment Department Surface Water Quality Bureau (NMED/SWQB). 2021. Quality Management Plan for Environmental Data Operations. Available at: https://www.env.nm.gov/surface-water-quality/protocols-and-planning/

United States Environment Protection Agency. Spreadsheet Tool for Estimation Pollutant Loads. Available at: https://www.epa.gov/nps/spreadsheet-tool-estimating-pollutant-loads-stepl

Acknowledgement Statement

New Mexico Environment Department Surface Water Quality Bureau

Post Fire Rehabilitation of the Rio en Medio
Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy (in hard copy or electronic format) of the "Post Fire Rehabilitation of the Rio en Medio" Quality Assurance Project Plan.

As indicated by my signature below, I understand and acknowledge that it is my responsibility to read, understand, become familiar with and comply with the information provided in the document to the best of my ability.

Kyla Chandler Digitally signed by Kyla Chandler
DN: cn=Kyla Chandler, o, ou, email=chandler.kyla@epa.gov, c=US
Date: 2021.04.08 16:34:46 -05'00'

Signature or Electronic Signature (e-certified accepted)

Kyla Chandler

Name (Please Print)

04/08/2020

Date

Return to SWQB QAO Miguel Montoya

Appendix A. Photo-documentation Field Form

Photo Point # and Site Location	Northing (GPS location)	Easting (GPS location)	Description	Comments