

GROUP A. PROJECT MANAGEMENT AND INFORMATION/DATA QUALITY OBJECTIVES

A1. Title Page

Quality Assurance Project Plan

Carson National Forest Fen Restoration

Revision 0

Funding Source:

Wetlands Development Grant #02F12301

Effective period: Three years from date of final approval

Submitted by:

Natural Channel Design Engineering Inc (NCDE) on behalf of New Mexico Environment Department
(NMED)

Surface Water Quality Bureau

May 2026

A2. Approval Page

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Acronyms

DQO – Data Quality Objectives
EPA – United States Environmental Protection Agency
NMED – New Mexico Environment Department
QA – Quality Assurance
QAO – Quality Assurance Officer
QAPP – Quality Assurance Project Plan
SOP – Standard Operating Procedures
SWQB – Surface Water Quality Bureau
TMDL – Total Maximum Daily Load
DEM – Digital Elevation Model
DQI – Data quality indicators
DQO – Data quality objective
EI – Environmental information
EIO – Environmental information operations
EPA – Environmental Protection Agency
GIS – Geographic Information System
GPS – Global Positioning System
JPEG – Joint Photographic Experts Group
LiDAR – Light Detection and Ranging
OPUS – Online Positioning User Service
PARCCS – Precision, accuracy, representativeness, comparability, completeness, sensitivity
PO – Project Officer
QA – Quality assurance
QAM – Quality assurance manager
QAPP – Quality Assurance Project Plan
QC – Quality control
RPD – Relative percent difference
RSD – Relative standard deviation
RTK – Real time kinematic
SOP – Standard Operating Procedure
SSURGO – Soil Survey Geographic Database
UAV – Uncrewed Aerial Vehicle
USACE – US Army Corps of Engineers

A4. Project Purpose, Problem Definition, Background

Project Purpose and Problem Definition

The purpose of this Quality Assurance Project Plan (QAPP) is to ensure valid and defensible data is used in the Carson National Forest Fen Restoration project. The project will reduce negative hydrological and ecological impacts from existing roads on fen wetlands on the Carson National Forest. This QAPP refers to the project as the Carson National Forest Fen Restoration. The Carson National Forest Fen Restoration is being managed by Wildlands Stewardship.

Fen wetlands within the Tres Piedras Ranger District of the Carson National Forest are ecologically significant headwater systems that support water quality, watershed stability, and high-value wildlife habitat. These rare ecosystems play a critical role in sustaining perennial flows and organic soil formation in northern New Mexico.

Forest Service Road 74 has encroached on and constricted multiple fen wetland systems, resulting in hydrologic disconnection, boundary loss, erosion gullies, soil degradation, trampling, and vegetation decline. Further road degradation exacerbates sediment delivery and disrupts natural flow paths thus impairing wetland function and resilience.

The goal of this project is to restore degraded fens by reestablishing contributing hydrology, stabilizing erosion and head-cuts, mitigating impacts from road infrastructure, and promoting wetland vegetation recovery.

Background

The New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) Wetlands Program seeks to contract with an eligible organization under the New Mexico Statewide Price Agreement (SWPA) #40-00000-23-00037 (with approved subcontractors as applicable). The selected contractor will implement an innovative fen restoration demonstration project to restore headwater slope wetlands. The goal is to restore 50 acres of degraded fen and other wetland systems by: reestablishing contributing hydrology, stabilizing erosion and head-cuts, mitigating impacts from road infrastructure, and promoting sediment capture, organic soil formation, and wetland vegetation recovery. Restoration designs will be approved by NMED and USFS and will also include Natural Channel Design Principles, established SWQB Wetlands Program methods where appropriate, and utilize hand and mechanized labor.

By using site adapted, nature-based restoration techniques such as sod structures, media lunas, contour swales, and targeting improvements to FS RD 74, the project will significantly improve hydrologic function, water quality, ecological condition, and wildlife habitat across wetlands. As a demonstration project, project outcomes and methods will be delivered through workshops, field tours, and presentations at the NM Wetlands Roundtable, supporting broader application of innovative and science-based fen restoration throughout the state.

There are no other relevant QA planning documents for this project.

A5. Project Task Description

Description

The Project will design and implement a restoration project for the degraded fen and several slope wetlands within the work area shown in Figure 1 within the Carson National Forest. Site characterization information will be compiled including hydrology, geology, soils, vegetation, and sediment dynamics to inform restoration methods and implementation.

The project consists of collecting pre- and post-construction monitoring data including longitudinal profiles, cross-sections, vegetation transects, and annual photo points to demonstrate effectiveness of the restoration structures.

This will be elaborated in more detail in Identification of Project Environmental Information Operations section B1.

Schedule

The project tasks include project administration and reporting, QAPP preparation, field reconnaissance, pre- and post- construction monitoring, restoration design, obtaining state and federal clearances, construction, volunteer workshops and field trips, and developing a technical guide and providing outreach.

Tables 1 and 2 outline the schedule, tasks, products, and responsible parties for the project. Task 1 project administration and reporting will occur from March 2026 to July 2027, with final reporting in December 2028. Task 3 QAPP preparation and approval will occur from March 2026 to May 2026. Task 2 field mobilization will occur in June 2026. Task 4 construction plans will be developed in June through October 2026. Task 5 USACE 404 permitting will occur in June to October 2026. Task 3 post construction monitoring will occur in July 2027. Task 6 volunteer workshops and field trips will occur in September to November 2027. Task 7 technical guide and outreach will be completed from July 2027 to December 2028. Task 1 final reporting will be completed in December 2028.

Table 1. Project schedule

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Table 2. Project Task, products, responsible party, timeline

Task	Timeline	Deliverables	Roles and Responsibilities
1. Project Administration /Reporting	March 2026 of Year 1 Reporting ongoing; Due Jan 31 and July 31 each year, Contract ends January 2028	• Timely reports and Invoices	• Invoices (Wildland) • Reporting (NCDE)
2. Field Reconnaissance and Preliminary Data Collection	Late April to Early June 2026 as weather allows	• Contractor (NCDE) data report/field notes/photos; design team meeting notes. • Inventory of preliminary restoration structure locations provided to USFS for archaeological clearance of potential disturbance sites.	• Contractor (NCDE) responsible for data collection, analyses and reconnaissance survey. • Contractor (Wildland) will organize and maintain design team. • Contractor (NCDE) submits necessary information to USFS/NMED for Archaeological survey and permits
3. QAPP & Pre/Post-Monitoring	June 2026 Pre-Monitoring, Fall 2027 Final Monitor Visit	• Executed QAPP • Approved pre/post monitoring plans (May 2026) • Monitoring reports (Annually in Winter) • Monitoring data (Annually in Winter)	• WPO and Contractor (NCDE) complete QAPP • Contractor (NCDE) delivers monitoring designs and execution with assistance from NMED and approval from NMED and USFS
4. Restoration Design	September 2026	• Design restoration structures and submit final designs for USFS/NMED approval	• Contractor (NCDE) and Design Team
5. State and Federal Clearances, Restoration Construction	Submitted to USACE by September 2026, Restoration Construction April-July 2027 as weather allows Back up window in Fall 2027	• Complete 404/NHPA compliance • Complete restoration construction • Final map showing GPS locations and types of structures.	• USFS submits documentation for clearances, Contractor (NCDE) and NMED help gather information • Contractor (Wildland) constructs restoration structures • WPO ensure installation follows site design for innovative structures
6. Volunteer Workshops and Field Trips for Restoration	September 2027	• Two workshops, Two Field Trips • Volunteer safety, match, and attendance sheets, photos • Field and workshop activities reported in the project reports	• Contractor lead (NCDE and Wildland) and WPO assist during volunteer workshops

7. Technical Guide and Outreach	Beginning Early Summer 2027 and Completed December 2027	• Technical guide • Wetlands Roundtable Presentations	• Contractor (NCDE) at NM Wetlands Roundtable events • WPO upload Technical Guide to NMED webpage
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Project Area

The project is located in central northern New Mexico, about 2 miles from the Colorado border (36.96836,-106.36192). See Figure 1 for map of project site.

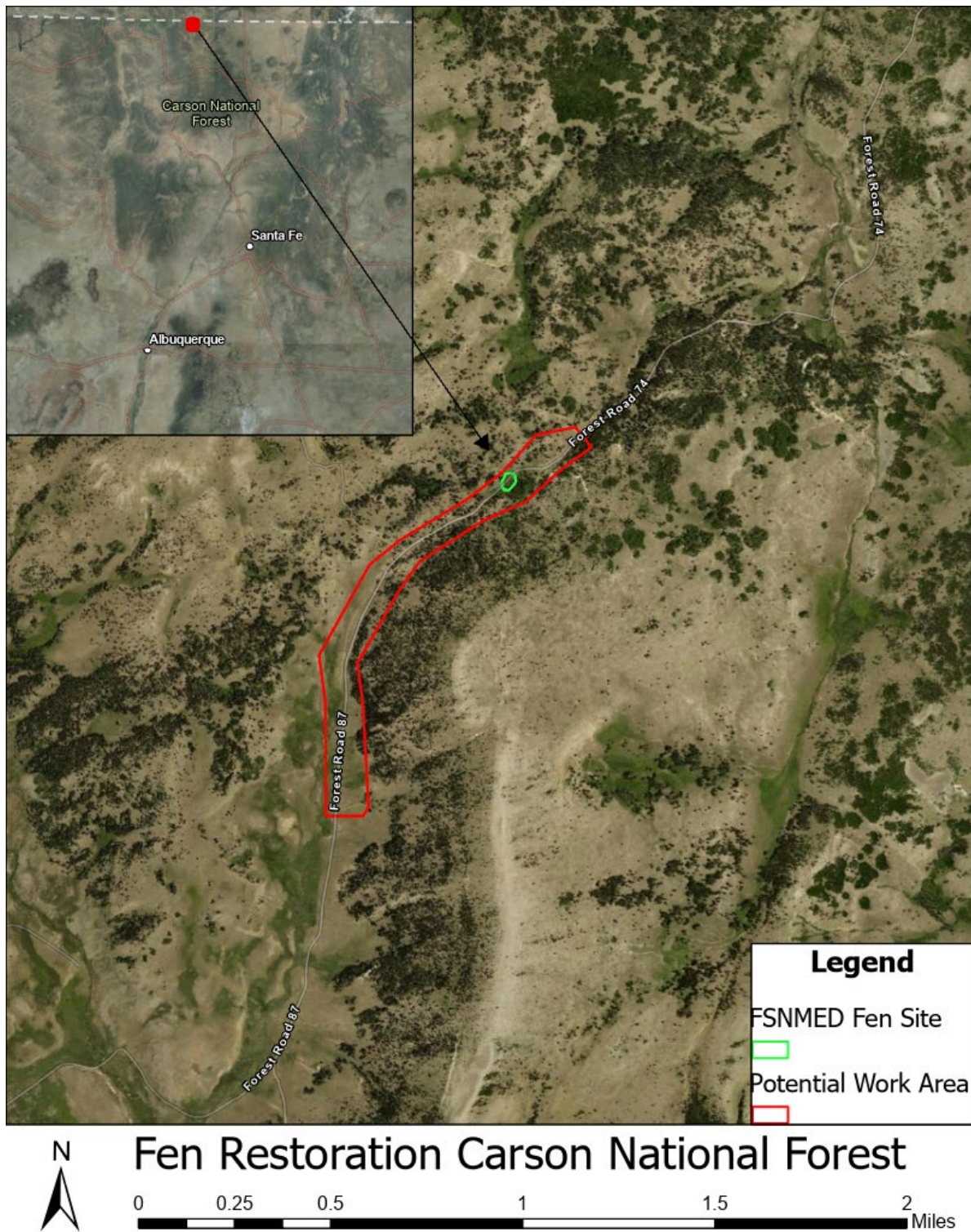


Figure 1. Project Area Map, work area in red, FSNMED fen site in green.
There are several slope wetlands located in the work area.

Monitoring Location Selection Criteria

Monitoring locations will be selected based on representation of treatment areas, vegetation condition, and visual documentation points. Monitoring locations for repeat photo points will be determined and documented during the design phase based on the location of the structures that will be built however it is understood that the areas outlined in Figure 2 are the most likely work areas in the polygon. We will select monitoring locations at a few of the different wetlands where restoration work is conducted.

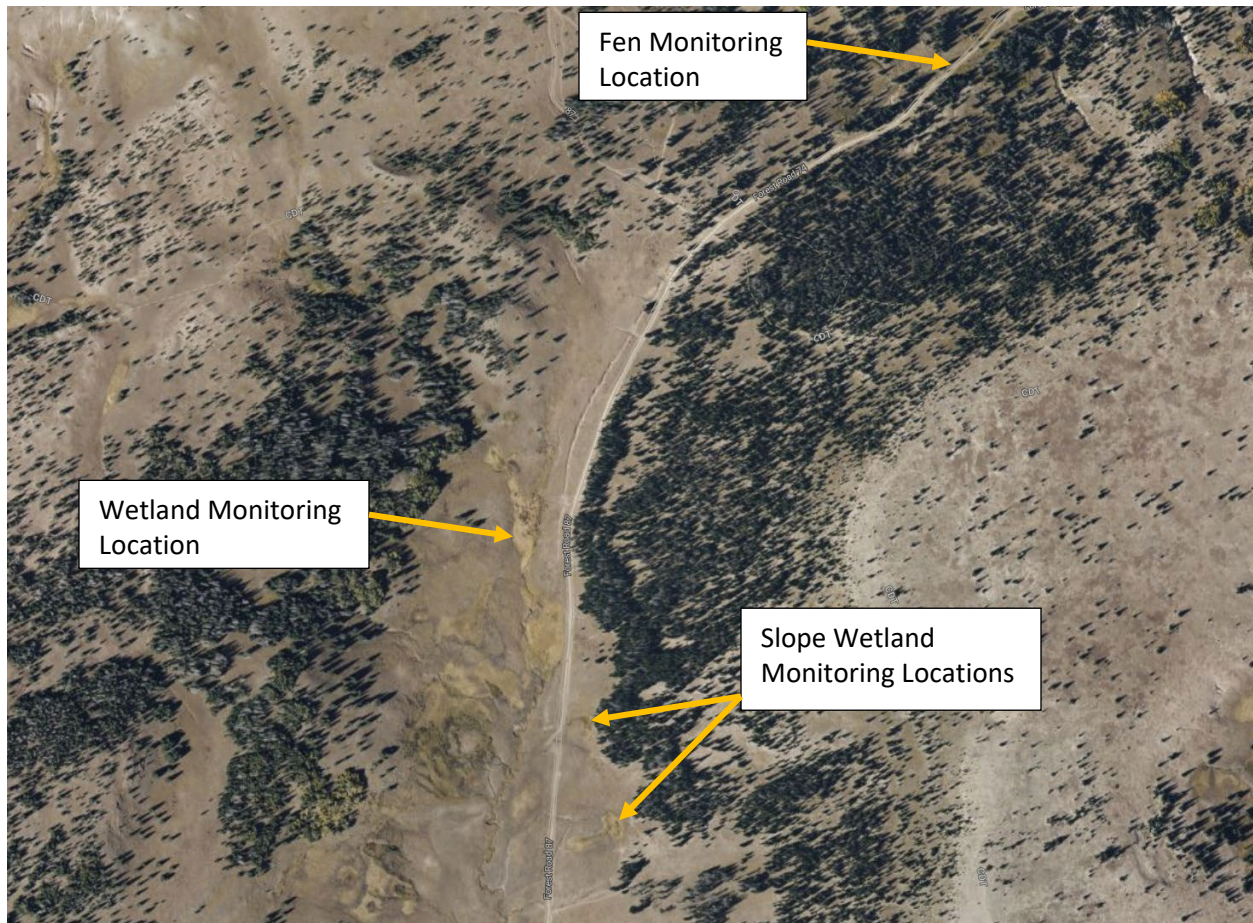


Figure 2. Location of potential monitoring activities in wetlands within work area

Restoration Activities

The project's goal is to improve hydrologic function, ecological condition, and wildlife habitat across the wetlands by reestablishing contributing hydrology, stabilizing erosion and head-cuts, mitigating impacts from road infrastructure, and promoting and wetland vegetation recovery. Restoration techniques may include sod structures, media lunas, contour swales, low tech-processed based designs and road drainage improvements targeting FS RD 74.

A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

The monitoring components are intended to determine whether headcuts/channel incision are repaired, wetland vegetation is increasing, and structures remain stable. The project's information/data quality objectives are described below. The project's performance and/or acceptance criteria to achieve the information/data quality objectives are described in Table 3.

Data Quality Objective (DQO)

The quality of the data will be adequate to provide a high level of confidence in determining measurable indicators of wetland condition, vegetation response, and ecological change following restoration of the Carson National Forest Fen Restoration.

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, accuracy, representativeness, comparability, completeness, and sensitivity.

Table 3 DATA QUALITY INDICATORS

Data Quality Indicator	Determination Methodologies
Precision	Cross section, longitudinal profiles, vegetation transects, and photo monitoring points will be monumented and GPS location recorded for repeat sampling. Longitudinal profiles and cross sections will be measured using equipment with sub inch accuracy of measurement (RTK and laser level survey). Drone (UAV) imagery will utilize automated flight plans and manual control for site photography. In-flight path position will be corrected by RTK.
Accuracy	Equipment with sub inch accuracy of measurement (RTK and laser survey), ensuring that transects, profile and cross sections are measured using the monumented locations, and comparison of repeat photos. Drone (UAV) imagery will utilize RTK GPS correction for in-flight position and post-processing.
Representativeness	The monitoring sites and photographic evidence will be taken at locations that will represent both pre- and post- restoration in time and space so that the information can be compared to determine the amount of change.
Comparability	Photo monitoring and all measurements at monumented locations. Drone (UAV) imagery can be repeated using the same automated flight paths.
Completeness	Checklist of activities that must be completed at each monitoring period.
Sensitivity	RTK logging for at least 2 hours during data collection, and OPUS post-processing for GPS precision. Sensitivity is ensured based on the manufacturer's specified range and accuracy of the equipment being used and the expertise of the field staff to use and apply data collection methods in a manner that minimizes subjectivity or gross data collection errors.

A7. Distribution List

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 the Project Manager. The Project Manager will distribute to all other project personnel listed below. 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 Acknowledgment Statements will be collected by the SWQB Project Officer and will be given to the QA Officer for filing with the original approved QAPP.

New Mexico Environment Department Surface Water Quality Bureau

Wetlands Program Project Officer: Shinya Burck, 505-500-9783
 Program Manager: Kathryn Lacey-Young, (505) 946-8863
 Quality Assurance Officer: Emily Miller, (505) 660-3534

Wildlands Stewardship

Project Manager, Jeremy Martin, (505) 692-4738

U.S. Environmental Protection Agency Region 6

Chief: Nelly Smith, State and Tribal Programs Section, (214) 665-7109
 Project Officer: Anthony Suttice, Water Division, (214) 665-8590

Natural Channel Design Engineering (NCDE)

Project Designer, Jake Fleishman, (928) 774-2336

A8. Project Organization

Table 4 below contains the distribution list, and project roles and responsibilities for this project.

Table 4. Project Roles and Responsibilities

<i>Name</i>	<i>Organization</i>	<i>Role</i>	<i>Responsibility</i>	<i>Contact Information</i>
Kate Lacey-Young	SWQB	Program Manager	Reviewing and approving QAPP, managing project personnel and resources	kathryn.lacey@env.nm.gov (505) 946-8863
Emily Miller	SWQB	QA Officer	Reviewing and approving QAPP	emily.miller@env.nm.gov (505) 660-3534
Shinya Burck	NMED SWQB	Wetlands Program Project Officer	Manage project progress, QAPP distribution, file management, assist in annual monitoring, data transfer, distribute semi-annual and final project reports	Shinya.burck@env.nm.gov 505-500-9783
Jake Fleishman, PE	NCDE	Project Designer	Project design, assist in QAPP and monitoring doctrine	jake@naturalchanneldesign.com 928-774-2336

			and collection, field assessment	
Jeremy Martin	Wildlands Stewardship	Project Manager and Implementation Lead	Manage project progress and construction implementation	wildlandstewardship@gmail.com 505-692-4738
Sam Ebright	NCDE	GIS Manager	Project GIS development, analysis and distribution, soil testing assistance	sam@naturalchanneldesign.com 928-774-2336
Lindy Hutchinson	NCDE	GIS Analyst	Project GIS development, analysis and distribution	lindy@naturalchanneldesign.com 928-774-2336
Mark Wirtanen	NCDE	Biologist and Permitting Management	Assist in vegetation observation and USAE 404 permitting	mark@naturalchanneldesign.com 928-774-2336
Cathy Scudieri	NCDE	Ecologist	Assist in vegetation management plan and vegetation observations	cathy@naturalchanneldesign.com 928-774-2336
Kyla Chandler	USEPA	Project Officer, Region 6	Reviewing and approving QAPP	chandler.kyla@epa.gov (214) 665-2166

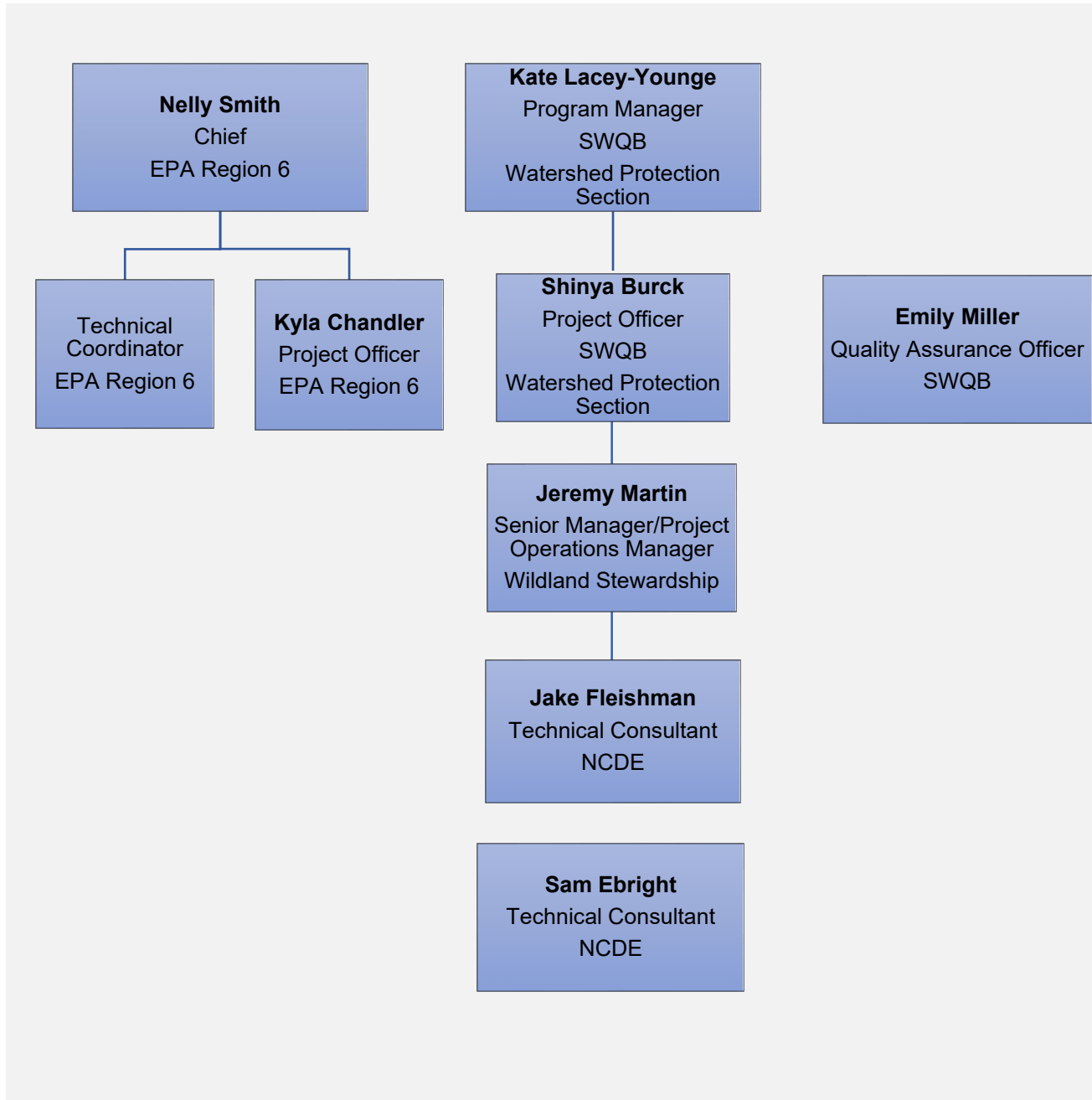
A9. QAO Independence

The QAO shall maintain independence in all QA matters and has the ability to directly and independently interact and initiate communication with technical staff and management. This direct access allows the QAO to independently elevate critical, quality-related issues to the attention of the Bureau Chief at their discretion without challenge or section approval. The QAO communicates with NMED senior management through the Bureau Chief and the Standards, Planning, and Reporting Team Supervisor. The SWQB Quality Management Plan (NMED/SWQB 2024) further documents the independence of the Quality Assurance Officer (QAO) from this project. The QAO is responsible for maintaining the official approved QAPP.

A10. Project Organization

Figure 3 presents the organizational structure for the “Carson National Forest Fen Restoration” project. Staff will provide feedback, concerns, or progress reports to the SWQB project officer. The Project Officer will then relay this information to the SWQB program manager, who will communicate with the EPA Project Officer as necessary. All communication will occur through phone and/or email.

Figure 3. Organizational Chart



A11. Personnel Training/Certification

This project will be primarily implemented by Wildlands Stewardship, who will be trained by the SWQB Project Officer in accordance with procedures identified in SOPs referenced in this QAPP. Data collection and monitoring for this project will be implemented by NCDE with technical assistance and oversight from the SWQB Project Officer. Volunteers will not be collecting monitoring data. Any individual conducting work for the project will review this QAPP and sign the acknowledgment statement prior to initiating any

work for this project. The signed acknowledgment statements will be kept on file with original QAPP by the QAO.

A12. Documents and Records

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, recorded field data, records of analytical data in hard copy or in electronic form, and QC records. Also included are project interim and final reports. Data captured on a global positioning system (GPS), camera, smart phone, tablet, or laptop will be downloaded to a NCDE 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 NCDE computer and on a separate external backup hard drive at the NCDE office. Hard copy project documents will be kept in a project folder in a file drawer at the NCDE office. All hard copy documents will be digitized and stored on a NCDE computer and backup hard drive (see Table 4). Copies of the data will be distributed by NCDE to NMED SWQB Project Officer after each field season, typically at the end of November. More detail on the management of project information is covered in B7. Environmental Information Management.

Table 5. Data Records for the Project

Document	Type of Form	Storage Location	Field Sheet Used
QAPP	Electronic (.doc) & Hard Copy	NCDE Server and Office	Quality Assurance Project Plan Standard. CIO 2105-S-02.1 . Located at: https://www.epa.gov/system/files/documents/2024-04/quality_assurance_project_plan_standard.pdf
Physical Habitat Field sheets (cross-section, longitudinal profile, vegetation transect)	Electronic (.xls) & Hard Copy	NCDE Server and Office	NCDE Standard Field Forms.

Photos and Drone Images	Electronic (.jpg)	NCDE Server and ArcGIS Online	Photo Point Checklist created for this project.
Interim and Final Reports	Electronic (.doc) & Hard Copy	NCDE Server and Office	NA

GROUP B. IMPLEMENTING ENVIRONMENTAL INFORMATION OPERATIONS

This QAPP was developed following the Quality Assurance Project Plan Standard and QAPP Standard Checklist (EPA, 2023).

B1. Identification of Project Environmental Information Operations

Environmental Information Operations (EIO) for this project include the collection, generation, and use of environmental data to evaluate restoration effectiveness and support project decision-making. Monitoring for this project will include:

- cross sections
- longitudinal profiles
- vegetation transects
- photo monitoring and drone imagery

These EIOs are designed to produce data of sufficient type, quality, and quantity to meet the Data Quality Objectives (DQOs) defined in Section A6, as well as the associated performance and acceptance criteria for data quality.

Cross sections and longitudinal profiles will be used to monitor repairs to headcuts and channel incision in the wetlands. At a minimum, one of each will be surveyed at each repaired wetland location where applicable. The goal of cross section monitoring is to show the change in topography after grading and the stability of the topography after grading relative to the DQOs for elevation accuracy and repeatability. The longitudinal profile is intended to show stability of the newly connected slope wetland and identify any headcuts that may appear. All cross sections and longitudinal profiles will be monumented with rebar at each end.

Vegetation monitoring will be used to monitor the change in vegetation over time and will follow the Vegetation Cross-Section Composition procedure described in Monitoring the Vegetation Resources in Riparian Areas (Winward, Alma H. 2000, Gen. Tech. Rep. RMRS-GTR-47). Three to five transects will be surveyed in each restored wetland, depending on the size of the wetland. All vegetation transects will be monumented with rebar at each end to ensure repeatable sampling and compliance with acceptance criteria.

Photo monitoring and drone imagery will be used to monitor the stability of repairs and installed structures and visual changes in vegetation. Several photo points will be set up in each restored wetland.

We will use Survey 123 (or similar app) to take geo-located photos and each location will also be monumented with rebar. These EIOs support qualitative DQOs for visual verification of site conditions and change detection. All photo points will be monumented with GPS to ensure consistent reoccupation and compliance with repeatability criteria.

Table 6. Project Monitoring Specifics

Responsible Party	Monitoring	Location	Frequency
NCDE	Cross Section	At each repaired fen/wetland	Pre and Post Restoration Spring 2026 & Fall 2027
NCDE	Longitudinal Profile	At each repaired fen/wetland	Pre and Post Restoration Spring 2026 & Fall 2027
NCDE	Vegetation Cross Section Composition	At each repaired fen/wetland	Pre and Post Restoration Spring 2026 & Fall 2027
NCDE	Photo Monitoring	At each repaired fen/wetland	Pre and Post Restoration Spring 2026 & Fall 2027
NCDE	Drone Imagery	At each repaired fen/wetland	Pre and Post Restoration Spring 2026 & Fall 2027

B2. Methods for Environmental Information Acquisition

Field Activities Environmental Measurements

Cross sections and longitudinal profiles data will be conducted in accordance with SWQB SOP 5.0. *Physical Habitat* (NMED/SWQB 2025). All applicable sections of SWQB SOP 5.0 will be adhered to during data collection for cross sections and longitudinal profiles.

Vegetation Cross-Section Composition surveys will be conducted in accordance with *Monitoring the Vegetation Resources in Riparian Areas* (Winward 2000). A vegetation identification field check will be carried out by the field team for identification of vegetation community type classification.

Photographic documentation will be conducted using Survey123 to geotag photographs and add attributes through a customized survey form.

To ensure consistent and repeatable photo monitoring, photo point locations will be carefully documented (including geographic coordinates) and monumented so they can be precisely reestablished during repeat photographic events. Each photo point will be selected to provide the best possible vantage for observing and tracking anticipated changes over the duration of the project. Including a portion of the horizon in each photograph helps orient the view and allows for quicker, more accurate comparison between images taken at different times. When conducting repeat photography, the original image will be referenced to match framing and composition as closely as possible, ensuring the scene is consistently captured.

Drone imagery will be collected using automated flight paths covering polygons of the work sites and individual oblique view photos will be taken using manual flight. If there is an error with automated flight paths, manual flight will be used to replicate the plan. Video footage will be captured during the same monitoring periods. Drone imagery will be used to produce orthomosaic photos showing overviews of pre- and post-construction during the monitoring period. Individual oblique photos will emphasize individual structures. Videos will be used as content in the story maps.

There are currently no planned modifications to SOPs that are expected to occur during the project, but in the case that an update is needed it will be documented by the Senior Manager/Project Operations Manager and reported to the SWQB Project Officer.

Laboratory Analyses

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

Existing Information

Existing LiDAR from the USGS, will be used to develop background topography and densify geomorphic survey data if necessary. LiDAR will be USGS Quality Level 1/2 and be provided with a survey report. These will be combined using USGS OPUS correction and/or common points along roads and other identifying features.

Existing Sentinel-II imagery from the European Space Agency, will be used for multispectral image analysis. Sentinel-II imagery will be used from the Level 2 collection which is analysis ready; post-processed sufficiently for atmospheric, radiometric correction and reflectance.

Existing Streamstats hydrology data from USGS, will be used to estimate statistically modeled storm recurrence intervals. Streamstats is a USGS government application with multiple regression models and suitable for hydrologic modeling.

Existing SSURGO soil data from NRCS, will be used as soil input for hydrologic models. SSURGO maintains high levels of quality control through NRCS by peer review, quality control, and quality assurance standards.

B3. Integrity of Environmental Information

Because there are no plans to collect samples for laboratory analysis, there are no handling requirements. The handling and storage of field logs and imagery data are described in section B7.

B4. Quality Control

The Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) guide the collection, processing, and validation of geospatial and environmental data for the Carson National Forest Fen Restoration project to ensure accuracy, consistency, and reliability.

Repeat photographs will be taken from the same monitoring locations utilizing a phone app for geo-referenced surveys to make it easy to locate monitoring points and past images to confirm photo alignment from the same locations. Quality control (QC) activities—including GPS field data collection and visual inspection of drone overlays—are performed routinely throughout the project to verify data precision and reliability. We will validate the identification of wetland vegetation using the regional plant guides.

Each QC activity is done on a regular schedule, and any errors or inconsistencies are quickly corrected and recorded in the metadata. Corrective actions are determined based on the nature and magnitude of discrepancy and are recorded to ensure transparency and traceability. All QC procedures, frequency schedules, corrective actions, and documentation follow the Quality Objectives and Criteria for Measurement Data, the SWQB Standard Operating Procedures (SOPs), and the photo-documentation procedures outlined in this QAPP. These practices reduce variability, improve data quality, and ensure dependable vegetation classification.

Quality Control mechanisms are implemented as described under the Information/Data Quality Objectives and Performance/Acceptance Criteria (section A6) as well as the sampling methodologies identified under this QAPP. Additional Quality Control includes the professional expertise of the personnel working under this project.

B5. Instrument/Equipment Calibration, Testing, Inspection, and Maintenance

Calibration and Frequency

The TRIMBLE RTK GPS survey and TopCon Laser Level have been recently maintained by the licensed supplier and are currently up to date. RTK receiver heads will be recalibrated to level following Trimble manual if required at the time of survey. Equipment will be calibrated in accordance with the directions provided by the manufacturer at the beginning of data collection.

The proper functioning and use of current firmware for the Anzu drone will be checked before deployment. Documentation of calibration and verification will be maintained by Sam Ebright and records will be kept with resulting data.

The Anzu drone will be calibrated before each flight. This includes checking to see if the gimbal for the camera is working properly and that the drone controls are functioning properly. Before collecting data, the drone needs to demonstrate to the pilot that it responds correctly. In addition, the GPS on the drone and on the controller need to show that the GPS location has been established. The drone will only be flown in authorized airspace with the GPS location active, and a home point has been recorded. The drone controller automatically prompts the pilot to update all firmware and flight map data to manufacturer's specifications before each flight and this step will be completed in the office before every drone mission.

Table 7. Maintenance, calibration, and testing of field and laboratory equipment and instrumentation.

<i>Instrument</i>	<i>Activity</i>	<i>Title /Position of Responsible Person</i>	<i>Frequency</i>	<i>Acceptance Criteria</i>	<i>Corrective Action</i>
Trimble R10 Receiver	Re-calibrate internal level	NCDE Field Staff	Monthly	Passing level in RTK internal software	Follow leveling procedure
TopCon Laser Level	Confirm Level	NCDE Field Staff	Bi Annual	Confirm level is within 0.1 feet on level ground	Mail back to TopCon for servicing if not level
Anzu Raptor Drone (UAV)	Re-calibrate compass, gyroscope, and gimbal	Sam Ebright	Monthly	Correct calibration in Anzu internal software	Follow calibration procedure

Testing, Inspection, and Maintenance

Field (survey and drone) equipment will be inspected prior to each sampling trip. 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. The Anzu drone and survey equipment will be inspected for damage and fully charged before each field event. In addition, drone flight restriction maps on the drone will be updated before each flight. If condition of equipment is in doubt, it will not be used. In the event of instrument failure, Sam Ebright will correct the problem, reject the resultant data or accept the data with notations.

B6. Inspection/Acceptance of Supplies and Services

There are no supplies or consumables that could affect the quality of data related to this project.

B7. Environmental Information Management

NCDE will be responsible for data management. Software updates to use the current version of ArcGIS, Survey123 and GoogleEarth will be completed when the software is used. All data will be converted to electronic format, stored and backed up by NCDE as well as stored online using ESRI cloud data services. Computer hard drives are backed up daily or will be backed up on external hard drives, respectively. Hard copies of field sheets will be maintained in a project binder organized by assessment and date and stored in a key protected filing cabinet in the office of NCDE.

Data will be sent to the SWQB Project Officer by the end of each field season by NCDE, typically by the end of November. Upon receiving data, the SWQB Project Officer will store data on SWQB network drive. The SWQB will retain project documents in accordance with applicable sections of New Mexico's

Disposition of Public Records and Non-Records regulation, codified at 1.13.30 New Mexico Administrative Code (NMAC) and Retention and Disposition of Public Records regulations, codified at 1.21.2 NMAC.

GROUP C. ASSESSMENT, RESPONSE ACTIONS, AND OVERSIGHT

C1. Assessment and Response Actions

The Project Officer will provide project oversight by periodically assisting with and/or reviewing data collection efforts. A review of the baseline data collection and monitoring efforts by the SWQB Project Officer will take place at the end of each monitoring season. 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. Oversight and Reports to Management

Annual reports will be submitted by the NCDE project lead 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 December 2027. The SWQB Project Officer will be responsible for submitting the final project deliverables to EPA through their Grants Reporting Tracking System.

GROUP D. ENVIRONMENTAL INFORMATION REVIEW AND USABILITY DETERMINATION

D1. Environmental Information Review

Data will be reviewed by the Field Team Supervisor 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 are 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 to determine the potential cause and usability. If a reasonable justification for use of the data cannot be attained, those data will not be used in analysis and implementation of activities listed under this QAPP unless the data can be recollected and assessed for usability.

Validation and Verification Methods

NCDE will ensure that valid and representative data are acquired. Verification of field sampling and analytical results will be performed by NCDE in accordance with the SWQB SOP 15.0 for *Data Verification and Validation Procedures* (NMED SWQB, 2023 or most current version). Verification and validation (V&V) of data will occur after every field season using the attached V&V worksheets (Appendix I). In the event questionable data are found, the SWQB Project Officer will be 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.

D2. Usability Determination

The quality of the data will be adequate to provide a high level of confidence in determining whether the Carson National Forest Fen Restoration 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.

NCDE will ensure that valid and representative data are acquired. Verification of field sampling and analytical results will be performed by NCDE. Verification and validation (V&V) of data will occur after every field season using the attached V&V worksheets. In the event questionable data are found, the SWQB Project Officer will be 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.

References

NMED/SWQB. 2025. Standard Operating Procedures for Data Collection [SOPs]. Latest update: November 20, 2025. Available online at: <https://www.env.nm.gov/swqb/SOP/>

NMED/SWQB. 2024. Nonpoint Source Management Plan. Resource Protection Division, Water Protection Section, Santa Fe, New Mexico, 87502. Available online at: <https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2024/12/2024-12-11-Final-2024-NPS-Management-Plan.pdf>

NMED/SWQB. 2016a. Standard Operating Procedures for Data Collection [SOPs]. Latest update: August 3, 2016. <https://www.env.nm.gov/swqb/SOP/>

NMED/SWQB. 2016b. 15.0 SOP Data Verification and Validation. Effective March 15, 2016. Available online at: https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2023/10/15.0-VV-SOP-20231017-Final-LG_MM.pdf.

New Mexico Environment Department, Surface Water Quality Bureau, Environmental Data Operations. Quality Management Plan. Approved by SWQB on: January 28, 2025. Approved by EPA on: February 27, 2025. Available online at: https://www.env.nm.gov/surface-water-quality/wp-content/uploads/sites/18/2025/03/25-173-2025-2026_SWQBQMP_EPAapproved.pdf

Winward, Alma H. 2000. Monitoring the vegetation resources in riparian areas. Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.

Appendix I – Verification and Validation Worksheet

Data and Equipment Verification and Validation Worksheet

Type of Data: _____

Name and Date of Personnel Collecting Data: _____

Verification of Complete Record [Y/N]: _____

Instrument in working order [Y/N]: _____

Checked for anomalous data [Y/N]: _____

Validated by [name of reviewer]: _____

Validated on [Date]: _____

Acknowledgement Statement

New Mexico Environment Department Surface Water Quality Bureau

Carson National Forest Fen Restoration
Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy (in hard copy or electronic format) of the “Carson National Forest Fen Restoration” 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.

Signature or Electronic Signature (e-certified accepted)

Name (Please Print)

Date

Return to SWQB QAO Emily Miller