

## GROUP A: PROJECT MANAGEMENT

### A.1 Title and Approval Sheet

Quality Assurance Project Plan  
For  
Watershed Project Implementation for the Mora River-Upper Canadian Plateau Phase 1B, NMED SWQB  
Grant No. 667-429-2E

Submitted by:  
New Mexico Environment Department  
Surface Water Quality Bureau

### APPROVAL SIGNATURES

_____ Abe Franklin Program Manager, SWQB Watershed Protection Section	_____ Date
_____ Emily Toczek Project Officer, SWQB Watershed Protection Section	_____ Date
_____ Miguel Montoya Quality Assurance Officer, SWQB Standards, Planning and Reporting Team	_____ Date
_____ Kyla Chandler Project Officer, Environmental Protection Specialist, WDAS, EPA Region 6	_____ Date
_____ Nelly Smith Chief, State and Tribal Programs Section, WDAS, EPA Region 6	_____ Date

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**ACRONYMS**

AU	Assessment Unit
BEHI	Bank Erodibility Hazard Index
BMP	Best Management Practices
DQO	Data Quality Objective
DQI	Data Quality Indicators
DO	Dissolved Oxygen
BMP	Best Management Practices
EPA	United States Environmental Protection Agency
HPWA	Hermit’s Peak Watershed Alliance
MRM	Management and Restoration Measures
NMED	New Mexico Environment Department
NMRAM	New Mexico Rapid Assessment Method
QAPP	Quality Assurance Project Plan
QA	Quality Assurance
QAO	Quality Assurance Officer
SLD	State of New Mexico Scientific Laboratory Division
SOP	Standard Operating Procedures
SWQB	Surface Water Quality Bureau
TBD	To Be Determined
STEPL	Spreadsheet Tool for Estimating Pollutants Loads
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
WBP	Watershed Based Plan
WPS	Surface Water Quality Bureau Watershed Protection Section
WQPD	Water Quality Protection Division

### A.3 Distribution List

Table 1. below contains the distribution list, project roles and responsibilities for this project. The QA Officer (QAO) 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 and Project Coordinator in Table 1. The Project Manager will ensure 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 QAO for filing with the original approved QAPP.

**Table 1. Distribution List, Project Roles, and Responsibilities**

Name	Organization	Title/Role	Responsibility	Contact Information
Abe Franklin	SWQB	WPS Program Manager	Reviewing and approving QAPP, managing project personnel and resources	(505) 827-2793 abraham.franklin@state.nm.us
Miguel Montoya	SWQB	QA Officer	Reviewing and approving QAPP, QA audits as needed to assure adherence to the approved QAPP.	(505) 827-2637 miguel.montoya@state.nm.us
Emily Toczek	SWQB	Project Officer	Manage progress of project, preparing QAPP, project reporting, coordinating with contractors, maintains project files, prepares final project report etc., data collection, and training.	(505) 819-8074 Emily.Toczek@state.nm.us
Lea Knutson, ED	Hermit's Peak Watershed Alliance	Project Manager	Project oversight, data management, oversight of project design and construction, review quarterly reports, project verification and validation of field data.	(505) 425-5514 lknutson@hermitspeakwatersheds.org
Conrad Greaves	Hermit's Peak Watershed Alliance	Project Coordinator	Project implementation, write up quarterly reports, project verification and validation of field data.	(505) 270-7398 cgreaves@hermitspeakwatersheds.org

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Conrad Greaves	Hermit's Peak Watershed Alliance	Field Team Supervisor / member	Field monitoring, data collection, record keeping, and submitting reports	(505) 270-7398 cgreaves@hermitspeakwatersheds.org
Patrick Gutierrez	Hermit's Peak Watershed Alliance	Field Team member	Field monitoring, and data collection.	(505) 429-8386 pgutierrez@hermitspeakwatersheds.org
Jacob Erickson	Hermit's Peak Watershed Alliance	Education/ Outreach Coordinator	Education and Outreach coordination	(505) 718 - 8403 jerickson@hermitspeakwatersheds.org
Kyla Chandler	EPA	Environmental Protection Specialist WQPD, Region 6	Reviewing and approving QAPP	(214) 665-216 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 2019) documents the independence of the Quality Assurance Officer (QAO) from this project. The QAO is responsible for maintaining the official approved QAPP, filed in the SWQB QAQC files on the network server. Figure 1 presents the organizational structure for the Watershed Project Implementation for the Mora River-Upper Canadian Plateau Phase 1B.

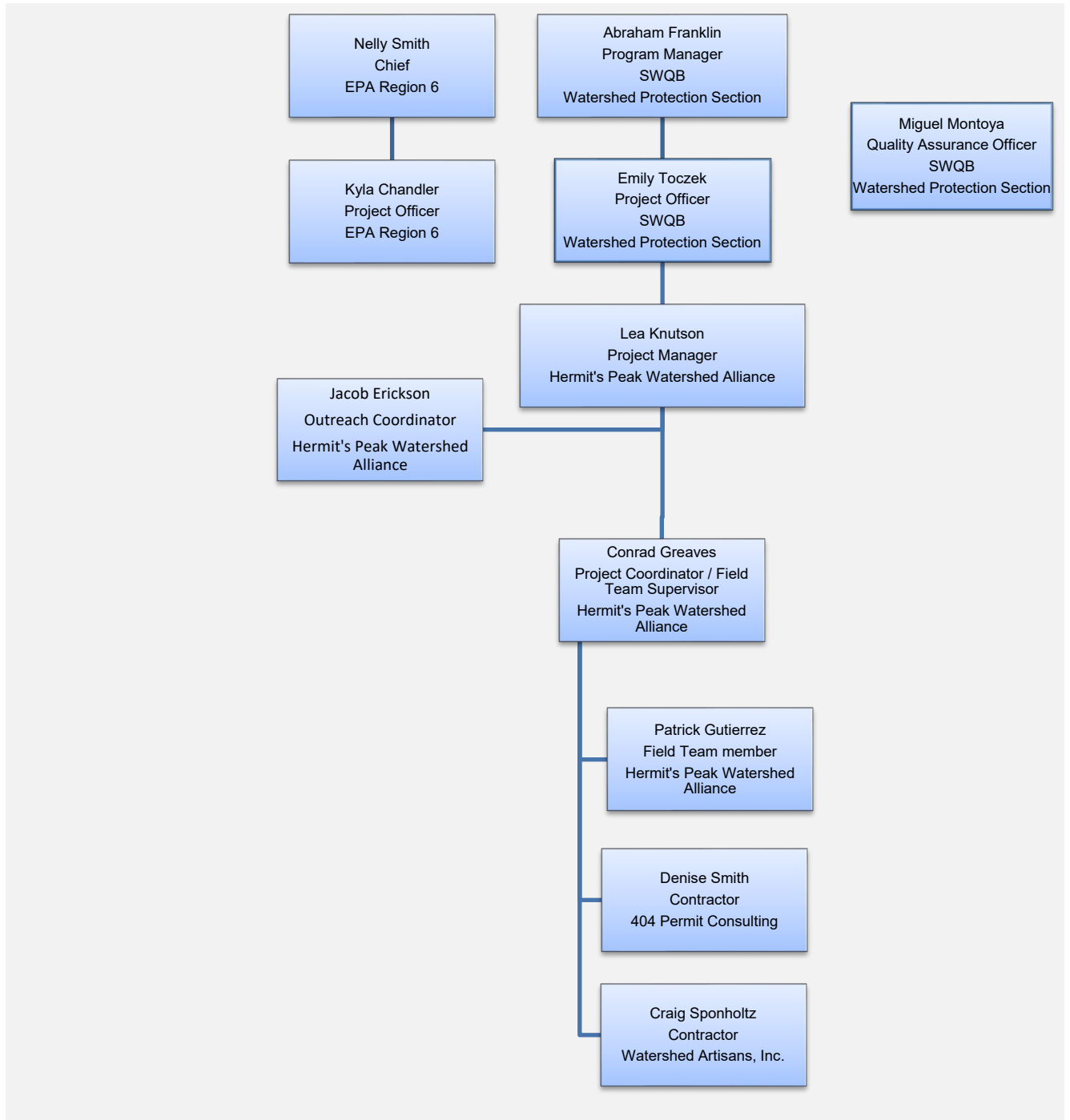


Figure 1. Organization Chart

## **A.5 Problem Definition/Background**

This QAPP refers to the project as the Watershed Project Implementation for the Mora River-Upper Canadian Plateau Phase 1B “Mora River Phase 1B”. Mora River Phase 1B is being managed by the Hermit’s Peak Watershed Alliance (HPWA). The purpose of this Quality Assurance Project Plan (QAPP) is to ensure valid and defensible data is used in the development of the Mora River Phase 1B. This QAPP will speak to data collection, data compilation, and analysis of water quality trends in the Mora River Phase 1B to monitor the effects of ongoing restoration activities started in the On-the-Ground Improvement Project for the Mora River, in furtherance of the Watershed-Based Plan for the Mora River, Upper Canadian Plateau.

In the most recent, 2020 to 2022 State of New Mexico CWA §303(d)/§305(b) Integrated Report, Appendix A, the Mora River was exceeding TMDLs for DO (2010) and plant nutrients (2015) and *E. coli* which was recently added in the 2020-2022 State of New Mexico CWA §303(d)/§305(b) Integrated Report, Appendix A.

### **Background**

The area addressed in the Mora River Phase 1B is located within the Mora Watershed in northeastern New Mexico. According to the EPA-Approved 2020-2022 State of New Mexico CWA §303(d)/§305(b) Integrated Report, Appendix A, the Mora River from the USGS gage east of Shoemaker to Hwy 434 is Not Supporting current water quality standards based on the Mora River’s designated uses. Specific water quality concerns include both excessive nutrients and elevated amounts of *E. coli*, which is a form of fecal bacteria specifically from mammals. The designated uses Marginal Coldwater Aquatic Life and Primary Contact are not supported.

The nutrient impairment was originally listed in 2004, according to the 2004-2006 State of New Mexico CWA §303(d)/§305(b) Integrated Report, Appendix A. The TMDL for nutrients approved by the EPA in 2007 states that the Mora River (USGS gage east of Shoemaker to Hwy 434) exceeded nutrient targets, specifically nitrogen and phosphorus, in multiple field tests conducted in 2002 by NMED SWQB (NMED SWQB., 2007). The TMDL recommends a total load reduction of 34% for nitrogen and 58% for phosphorus. The pollutant source summary for the Mora River (USGS gage east of Shoemaker to Hwy 434) identifies 54% of the total phosphorus and 62% of the total nitrogen as point source (from municipal and industrial source discharge). Mora Mutual Domestic Water and Sewerage Works Association, and Mora National Fish Hatchery and Technology Center all have State issued NPDES permits in the Mora Watershed.

Probable sources of nutrient impairment are identified in the 2007 TMDL as: flow alterations from water diversions, municipal point source discharges and on-site treatment systems (septic systems and similar decentralized systems). The updated 2015 TMDL also adds the following probable sources: recreation pollution sources, silviculture harvesting, wildlife other than waterfowl, habitat modification, drought-related impacts, natural sources, and rangeland grazing. During the lower Mora Watershed WBP assessment, in addition to the previous mentioned sources, HPWA also identified loss of riparian habitat, loss of wetlands, mass wasting and streambank modifications/destabilization as other probable sources of nutrient impairment.

The *E. coli* impairment was first listed in the 2018-2020 Integrated Report. A TMDL for this *E. coli* impairment was completed in August 2019 and approved by EPA in September 2019. The probable sources for *E. coli* impairment are listed as crop production (dryland), dams/diversions, gravel or dirt roads, irrigated crop production, on-site treatment systems, paved roads, rangeland grazing,



residences/buildings, and waterfowl (Final Draft total Maximum Daily Load (TMDL) for the Canadian River Watershed, Aug 2019). Natural sources of *E. coli* are also present in the form of wildlife such as elk, deer, waterfowl and other warm-blooded animals. Bacterial concentrations may become elevated when bacteria laden sediment is re-suspended during storm events or by other subsequent disturbance such as trampling by livestock or wildlife. The number of exceedances on the Mora River from the USGS gage east of Shoemaker to HWY 434 was 3 out of 15. The *E. coli* TMDL for this Mora River reach is  $5.17 \times 10^{-9}$  colony forming units (cfu) per day. TMDLs for bacteria were calculated based on flow values and water quality standards. The monthly geometric mean criterion was utilized in the TMDL calculations to provide an implicit Margin of Safety.

In 2016, HPWA released the EPA approved Watershed Based Plan (WBP) which assessed watershed-wide conditions that contribute to this nutrient impairment and planned a strategy to reduce this nutrient water quality problem with ultimate hopes of removing the lower Mora River from the list of impaired waters. The Watershed Based Plan for the Mora River - Upper Canadian Plateau (WBPMR – available at [hermitspeakwatersheds.org](http://hermitspeakwatersheds.org)) forms the basis of the first and now this second phase of on-the-ground work beginning a long-term effort to improve water quality and overall watershed health in the lower Mora River Watershed. The first phase of on-the-ground project began in September 2017 and was completed in June 2020. As stated in the WBPMR, together with private landowners, experts, and other cooperators, 21 projects were accomplished, and consequently nutrient load reduction goals were exceeded.

### **Objective/ Goal**

The goal of the Project is to continue activities started in the first phase of On-the-Ground Improvement Projects for the Mora River, in furtherance of the Watershed-Based Plan for the Mora River, Upper Canadian Plateau. This project, Mora River Phase 1B, will continue watershed project implementation started in the On-The-Ground Improvement Projects for the Mora River – Upper Canadian Plateau Phase 1A completed June 30, 2020. This project is the second phase of implementation laid out in the 2016 WBP and no revisions to the WBP are planned with this grant. There are no obsolete, inaccurate, or insufficient details that need to be addressed.

The project will reduce loading of plant nutrients and *E. coli* into the Mora River by implementing wetland and in-stream restoration, road decommissioning, road drainage improvements, upland vegetation restoration, riparian buffer creation, riparian planting, livestock management and education and outreach.

The objectives of this project include the Mora River-Upper Canadian Plateau (UCP) Monitoring Project, intended to answer the flowing question: What are the stream load reductions as a result of implementing restoration projects in the Mora Watershed.

Stated as a decision: The information gathered by the Mora River-UCP Monitoring Project will be used in the Spreadsheet Tool for Estimating Pollutant Loads (STEPL). The data collected during this will be used as inputs to STEPL as applicable to determine potential load reductions resulting from Best Management Practices (BMP) implementation.

The Mora River Phase 1B will help inform stakeholders as to what the potential current water quality issues are based on up to date on the ground monitoring efforts. This information can then be used to better understand why the Mora River is not supporting the designated beneficial use of Marginal Coldwater Aquatic Life and Primary Contact.

## A.6 Project/Task Description

### Description

The purpose of the Project is to produce measurable improvements in water quality, related to plant nutrients, TP – Total Phosphorus and TN – Total Nitrogen, and *E. coli*, by 2024 because of implementing these Management and Restoration Measures (MRM). Load reductions for TN and TP were estimated for each MRM in the WBP. Using those expected load reductions, we estimated the potential TN and TP load reductions for all aspects of the six on-the-ground MRMs in this phase 1B project as TN load reduction of 7.6 pounds per day, and a TP load reduction of 1.7 pounds per day. No relationship between MRMs and expected load reductions were determined for *E. coli* in the WBP since it was not considered an impairment of the Mora River at that time. A potential goal for this project is to decrease the number of exceedances to less than 3 out of 15 and therefore improve water quality towards meeting the single sample as well as the geometric mean water quality standard for *E. coli*. If *E. coli* continues to be problematic in the watershed during this grant cycle despite this stated goal, a future project may include amending the Mora Watershed Based plan to better articulate the reduction in *E. coli* loading that needs to occur with different MRMs.

The above stated load reduction goals, however, may not be fully met until restored vegetation reaches maturity and all MRMs are in place.

While the goals above are the minimum load reductions required to meet the goals for Mora River Phase 1B, we anticipated meeting much higher load reductions for this project. For example, we did a number of projects at the Fort Union Ranch, which is in the Phase 1C area, increasing potential load reductions in the Wolf creek. See Figure 2.

Detailed load reductions using STEPL will be calculated by HPWA after construction and implementation of BMPs at the end of the Project. The model STEPL itself has been validated and verified as a model and is widely accepted and used by Federal and State agencies. The NMED SWQB Project Officer will assist HPWA in STEPL calculation, if needed, by providing online resources for using the STEPL Model.

A dissolved oxygen (DO) logger will be deployed if time and resources allow with support from the SWQB. The DO logger will be deployed near the bottom of assessment unit so that the data collected during the Phase 1B project may be considered for use in a complete nutrient impairment assessment according to the NMED SWQB Comprehensive Assessment.



**Figure 2. Location of the Fort Union Ranch which is upstream of other Mora restoration projects Schedule**

Planned project start date is the first of August 2020 with a planned project end date of June 30, 2023.

**Table 2. Project tasks, products, responsible party, and timeline for WCWP**

Task	Product	Responsible Party	Approximate Start Date	Approximate Completion Date
Project Management and Administration	Procurement for contract, Contracts with subcontractors, Quarterly reports, Invoices with match reports, Final Report, Notice of Completion	Lea Knutson, HPWA	Aug. 2020	June 30, 2023
Quality Assurance Project Plan	Approved QAPP	Lea Knutson, HPWA	Sep. 2021	Sept. 2021
Engage Stakeholders and Community Education	Completed articles, media posts, radio and community meetings; completion of 5 education events; completion of 5- 10 YouTube videos.	Jacob Erickson	July 2021	May 2023
Project Coordination and Contractor Oversight	Final project designs and logistics plans; project completion, final report.	Lea Knutson, HPWA	Nov. 2020	March 2023
Develop and Implement Management Measure #1 and #4	Conduct restoration projects #1 and #4 listed in the project proposal. See Map of project locations included below.	Craig Sponholtz, Watershed Artisans, Inc.	Jan. 2021	June 2023
Develop and Implement Management Measure #2, #3, #5, #6, and #7	Conduct restoration projects #2, #3, #5, and #6 listed in the project proposal. See Map of project locations included below.	Contractor has not been selected	Jan. 2021	June 2023
Implement Restoration Management Measure #7	Conduct restoration projects #7 listed in the project proposal. See Map of project locations included below.	Jacob Erickson, HPWA	July 2021	June 2023
Sonde Data Collection	Stream temperature, turbidity, pH, DO, and specific conductivity	Conrad Greaves, HPWA	Fall 2021	June 2023
Surface Flow Monitoring	Surface flow will be collected at all monitoring sites using a Velocity Meter.	Conrad Greaves, HPWA	Fall 2021	June 2023

Task	Product	Responsible Party	Approximate Start Date	Approximate Completion Date
Permitting	404 Permits for MM#s 1, 3, 4 and 404 annual reporting within grant period.	Denise Smith, Conrad Greaves	Fall 2021	Dec. 2022
Monitoring (nutrient and <i>E. coli</i> )	Approved QAPP; completed annual Nutrient, <i>E. coli</i> and Sonde assessments;	Conrad Greaves, Patrick Gutierrez, HPWA	Fall 2021	June 2023
Monitoring (physical habitat measurements)	pre- and post-treatment physical habitat measurement at all in-stream BMP project sites that require stream morphology manipulation, at the minimum.	Conrad Greaves, Patrick Gutierrez, HPWA	Fall 2021	June 2023
Reporting to SWQB Project Officer	Regular Reports	Lea Knutson HPWA	Jan. 2021	June 30, 2023
Reporting to EPA	Quarterly and Final Report to EPA	Emily Toczek, NMED	Fall 2021	June 30, 2023

### Project Area

The area addressed in this project, On-The-Ground Improvement Projects for the Mora River - Upper Canadian Plateau Phase 1B, covers NMED Assessment Units (AU) including NM-2305.3.A\_00 and NM2305.A\_10. The specific focus areas are included as potential project locations because they contribute to the TMDL loads. Map 1 shows the implementation priorities of the Mora River reaches based on the WBPMR.

Work focuses in the following 12-digit Watersheds:

- 110800040309,
- 110800040403,
- 110800040501,
- 110800040502,
- 110800040503,
- 110800040505

The project area in stream miles is 33.5 miles and a total project area of 58 square miles. See Figure 3 for project area map.

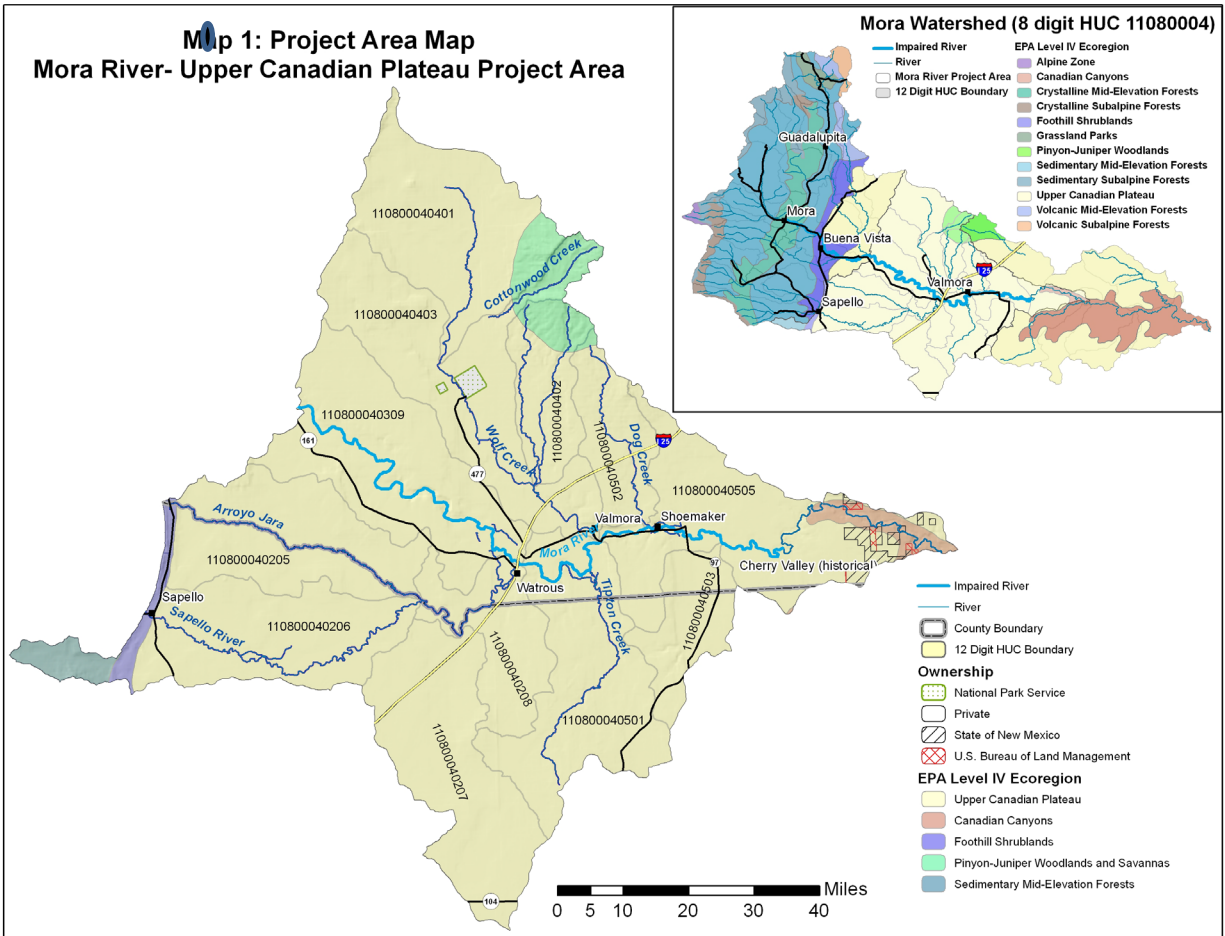


Figure 3. Mora River – Upper Canadian Plateau Phase 1B Project Area.

### Monitoring Location Selection Criteria

A monitoring program will be conducted to evaluate the watershed-wide effectiveness of implementation efforts based on the criteria outlined in the WBPMR. The program will include annual nutrient sampling (Total Phosphorus and Total Nitrogen) at seven consistent sampling locations and *E. coli* samples will be added in support of the new (2018- 2020) impairment. Standard water quality data (pH, conductivity, turbidity, dissolved oxygen, temperature) and flow will also be collected at each sampling location to help describe overall water quality conditions and detect any water quality concerns that could be related to the nutrient impairment. Additionally, Physical Habitat Characteristics will be measured pre- and post-treatment at all instream project locations during this phase. At the end of Phase 1B, an assessment of the monitoring data will occur to determine whether progress is being made in reducing the nutrient load and to have a continual record for long term monitoring. See Figure 4 for location of monitoring sites.

Table 3. Monitoring Stations Meta Data

Number of Monitoring Stations	Monitoring Station ID	Lat	Long	Assessment Unit	WQS Reference
1	MR1	35.81621	-104.86867	NM-2305.3.A 00	20.6.4.307
2	MR1A	35.81418	-104.89764	NM-2305.3.A 00	20.6.4.307
3	MR1B	35.80108	-104.92784	NM-2305.3.A 00	20.6.4.307
4	MR2	35.79631	-104.97715	NM-2305.3.A 00	20.6.4.307

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5	MR3	35.79658	-104.97943	NM-2305.3.A 00	20.6.4.307
6	MR3B	35.86129	-105.0771508	NM-2305.3.A 00	20.6.4.307
7	MR4A	35.84135	-105.05406	NM-2305.3.A 00	20.6.4.307

The above monitoring will be completed in order to assess water quality trends, compare analytical results to New Mexico water quality standards and determination of load reductions of TP and TN; however, other monitoring efforts will also take place to look at the general watershed condition and identify any other conditions (besides stream nutrients) that may be of concern, such as visual field observation of probable sources of impairments. All visual observation will be recorded on field sheets or a project-specific field notebook. Monitoring will also be used as an educational tool, when possible, by working with community volunteers and student interns. This continual adaptive management is expected to occur for on-the-ground projects and education and outreach programs. Monitoring results will be provided to the SWQB in electronic format and hard copy and interpreted in the final project report.

Measures of success will include: 1. Stream length/acres/number of started projects, 2. Water quality trend analysis and water quality standards attainment 3. Number and type of education efforts completed, 4. Narrative assessment of general effectiveness, 5. Narrative assessment of general conflicts/issues.

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 impact of any changes on the technical and quality objectives of the project. This Project Plan will be reviewed annually by the Project Manager and Project Coordinator to determine the need for revision, a revisions will occur to the QAPP if substantial changes to monitoring efforts and activities need to be revised.

Mora 319  
Monitoring Sites

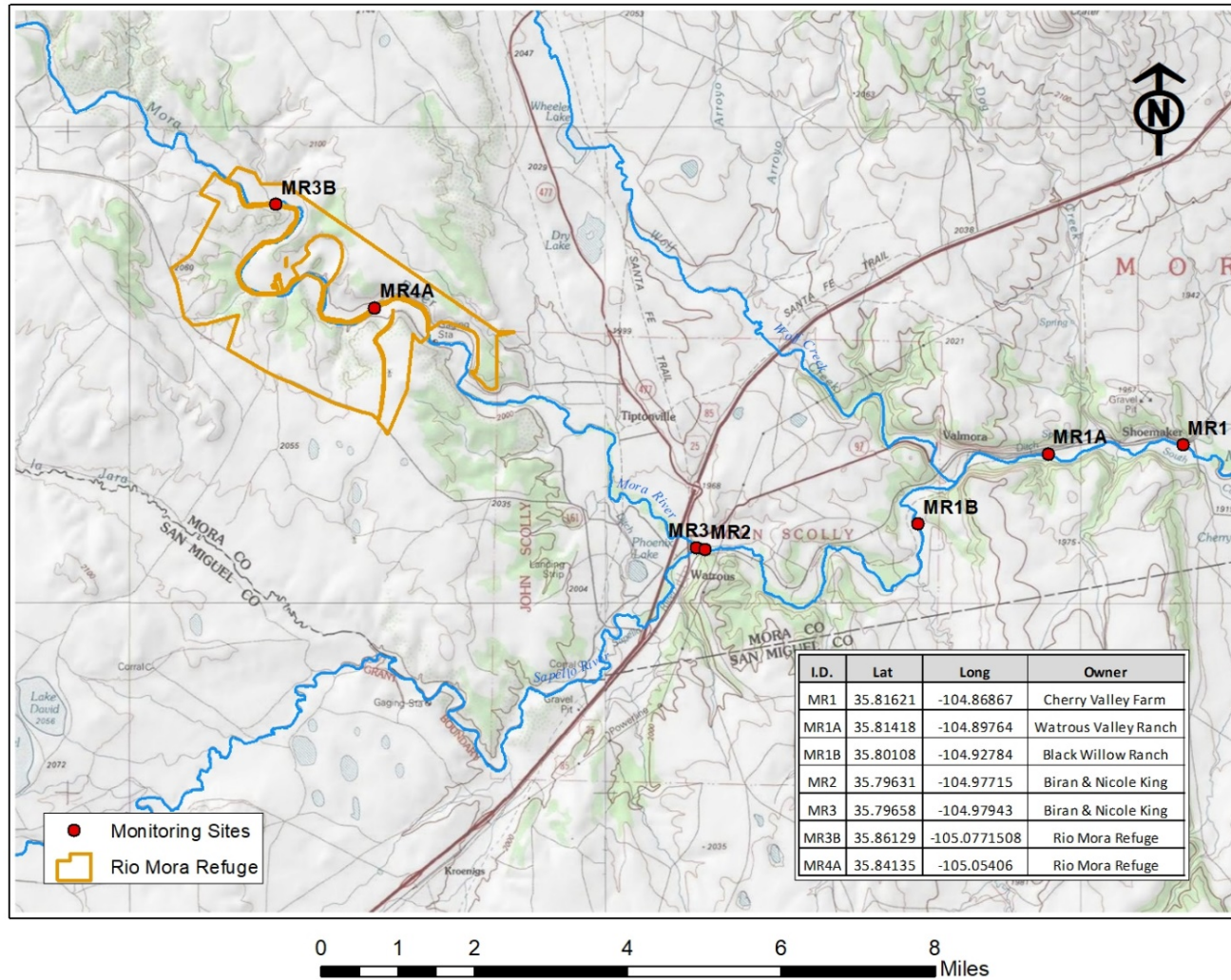


Figure 4. Monitoring sites modified from the Lower Mora Watershed Base Plan; Rio Mora Wildlife Refuge highlighted in yellow.



### **Restoration Activities**

#### **Management Measure #1: Wetland and Instream Restoration – Mora River/Tipton Creek – Black Willow Ranch (BWR)**

The Black Willow Ranch (BWR) became a partner during the development of the WBP and was named Ranching Champion during the first implementation Phase 1A of the On-The-Ground Improvement Projects for the Mora River Upper Canadian Plateau. The concept of a ranching champion, is one local rancher who showcases to the other ranchers in the community the benefits of restoration activities. During the Phase 1A project HPWA worked with BWR to install livestock management infrastructure needed to control grazing distribution across this 6,682 acre ranch. With that infrastructure now mostly in place, HPWA and BWR are ready to begin needed upland and valley bottom restoration. This project entails restoring a riverine wetland at the confluence of Tipton Creek and Mora River. At this location, historic channel dredging, straightening and berm construction reconfigured the confluence, drastically reducing its ecological functions. Removing berms and reconstructing a riverine wetland at this strategic location will sequester sediments and nutrients from the highly erosive 16 mile ephemeral channel of Tipton Creek as well as upstream areas of the Mora River. This confluence was deeply dredged leaving steep and continually eroding 4-6' banks with limited floodplain connection. The restoration of the riverine wetland in this location is identified as a high priority in the Land and Water Restoration Plan developed for BWR in the previous on-the-ground project Phase 1A. Restoring wetlands was listed as a priority Restoration Measure in the WBP with a high effectiveness of reducing the nutrient impairment. Watershed Artisans will finalize the design and construct this project.

#### **Management Measure #2: Road Improvements – Black Willow Ranch**

A minimum of two miles of road decommissioning and road drainage improvement work will be done at BWR by a subcontractor to be selected. Erosion and consequent sedimentation from road surfaces and adjacent affected areas occurs at numerous locations on the 66 miles of roads on the BWR. Repairing poorly functioning roads was identified as a high priority in the Land and Water Restoration Plan developed for BWR. Ongoing work will be continued during this Phase 1B project and will include decommissioning and properly draining nonessential roads, installing drainage features on all open roads, and adding road base aggregate as needed. This work will be taken on by both BWR independently and with HPWA assistance. Decommissioning nonessential and heavily degraded roads will be the priority during this project phase.

#### **Management Measure #3: Multipronged Management and Restoration - Dog Cr. – Fort Union Ranch (FUR)**

Dog Creek is the downstream-most tributary of the Mora River in the watershed. No restoration or improved management work has occurred to date. HPWA will begin a multipronged approach to establish sound management and restore healthy features to this significantly degraded intermittent stream. Livestock management will be addressed with riparian fencing and upland water development. Instream structures (e.g. Beaver Dam Analogs, one-rock dams, worm ditches, baffles) will be used to restore strategic locations and streambank protections will be used to arrest bank erosion. Planting riparian vegetation will occur to complement the other work where livestock management is in place. Design work and construction of instream aspects of the project will be done by Craig Sponholtz of Watershed Artisans. HPWA will work closely with Fort Union Ranch (FUR) to design and build livestock management infrastructure. FUR will offer match for fencing, water development work, and riparian planting. Coordination with the downstream landowners, will also occur.

**Management Measure #4: Instream Restoration – Mora River – Rio Mora National Wildlife Refuge**  
Craig Sponholtz of Watershed Artisans will design and construct an induced meander and floodplain reconnection project along 0.5 mile of the Mora River at the upstream most boundary of the Rio Mora National Wildlife Refuge. This project was originally identified by Bill Zeedyk and was included in a NEPA developed and approved for Rio Mora NWR in 2019. The Mora River is not severely incised in this section making re-establishing access to the river's historic floodplain practical. The US Fish and Wildlife Service will assist with doing the archaeological surveys necessary for the 404 permit and will offer materials for the project to be harvested on site.

**Management Measure #5: Upland Vegetation Restoration and Riparian Buffer – Goetsch Farm**

The Goetsch Farm was identified as an Agriculture Champion during the phase 1A on-the ground projects. During that time an 8 acre riparian buffer was created with Keyline Plow and seeding in 2019. During phase 1B this riparian buffer will be extended to include an adjacent area. This project involves developing and implementing a Keyline Plow design to revegetate a degraded pasture with native perennials. This field has been fallowed for many years, is compacted, and is dominated by weedy annuals. After restoration, those two pastures will provide a riparian buffer and upland revegetation project to sequester sediments and agriculture by products along the majority of the length of the Mora River at the Goetsch Farm.

**Management Measure #6: Cottonwood Planting and Caging along Wolf Creek – Black Willow Ranch**

Planting and caging cottonwoods will occur along Wolf Creek near its downstream confluence with the Mora River on the Black Willow Ranch. During Phase 1A cages were built around mature and regenerating cottonwoods to protect this limited riparian vegetation from elk, cattle and beaver along the Mora River just upstream of its confluence with Wolf Creek. To complement that work, cottonwoods will be planted and caged during this 1B phase on the Wolf Creek side of that confluence where few if any cottonwoods currently occur. Existing mature and regenerating cottonwoods will also be caged along Wolf Creek if appropriate.

**Management Measure #7: Education and Outreach**

HPWA staff Jacob Erickson will continue efforts to provide landowner education and support through a variety of events. HPWA will offer at least 5 local, free and inviting hands-on workshops, tours, and presentations to landowners and the general community as part of our Land Stewardship Series. These educational events will showcase healthy or restored areas, explain degraded watershed characteristics and demonstrate improved management and restoration techniques. Some of these events will be hands-on workshops that will simultaneously accomplish aspects of the restoration and management work described in the above Management Measures, such as riparian planting and fencing. Craig Sponholtz will be recruited to conduct one training for landowners and other watershed restoration practitioners pertaining to assessment and design of instream restoration projects. Also, as part of ongoing HPWA efforts to build public understanding of watershed issues and solutions, pertinent YouTube videos will be produced and made available on social media, our website, and websites of our collaborators. These short videos will feature specific watershed restoration techniques that can be done by landowners and deepen understanding of land management approaches to prevent degradation. Examples of these videos are: construction of one-rock dams, Zuni Bowls or rock rundowns to address erosion and restore flow; design

and function of road rolling dips; how do arroyos form; how to plant willows or cottonwoods; how to build a cage to protect riparian vegetation; and construction of a wildlife-friendly riparian fence.

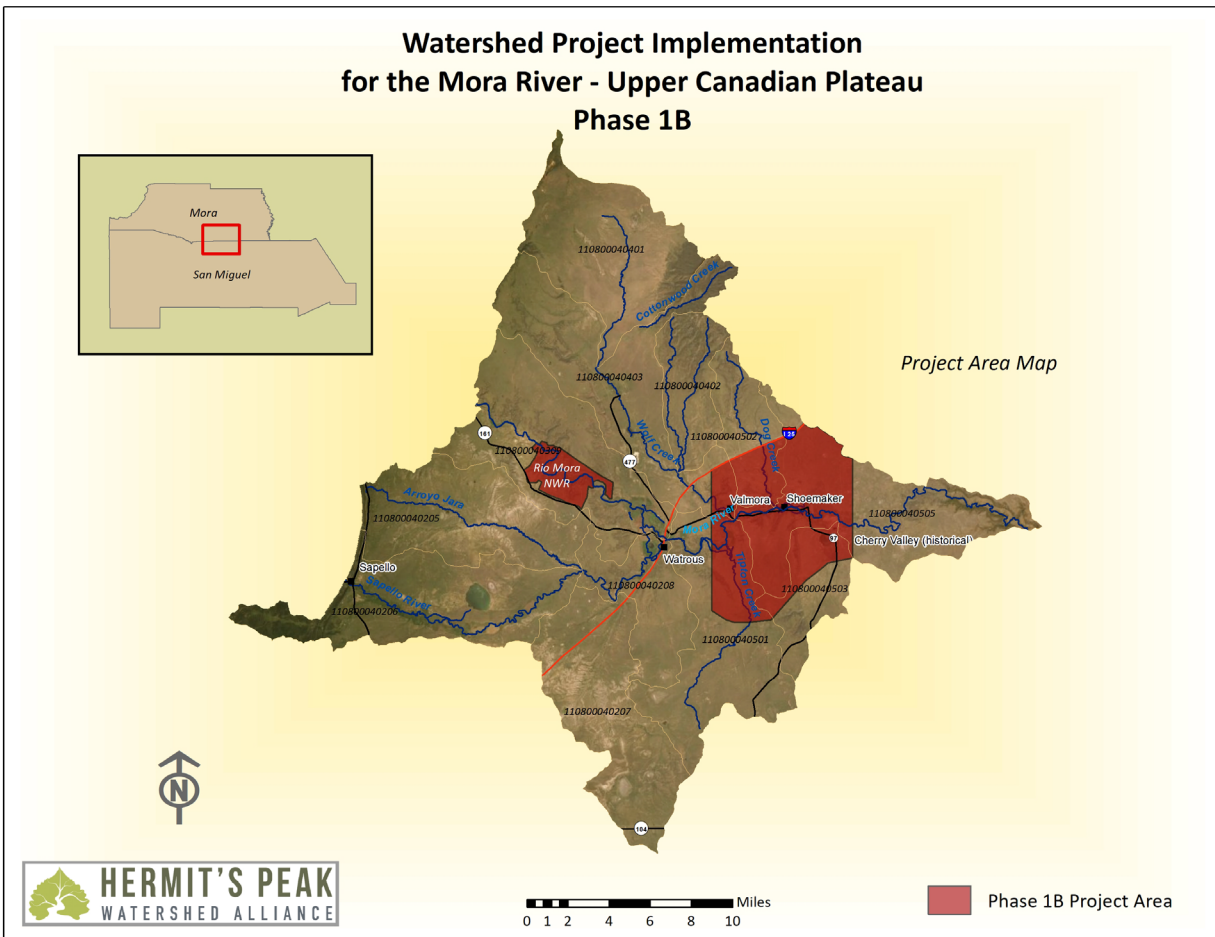


Figure 5. Mora River Phase 1B Project Area Map

## A.7 Quality Objectives and Criteria for Measurement Data

### Question/Decision

The data collection and monitoring components of the Mora River Phase 1B are intended to answer the following questions:

Have changes to water quality occurred, specifically for TP and TN, as a result of implementing restoration projects in the Mora Watershed?

The monitoring data collected during Phase 1B project will be used to help answer this question.

### Data Quality Objectives

The quality of the data will be adequate to provide a high level of confidence in determining effects of future changes in management and active restoration on the Mora River. The quality of the data will be collected according to Standard Operating Procedures (See section B2) in order to provide a high level of confidence in the restoration projects and will be used to determine the effects to water quantity predicted project implementation in the Mora River Phase 1B.

**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.

**Table 4. Data Quality Indicators**

DQI	Determination Methodologies
Precision	Will be ensured by using the standardized procedures identified in this QAPP. Having two trained field team members present at all times while collecting data. Analytical methods for nutrients and method reporting limits for the laboratory will be within a sensitivity that is able to report below the established nutrient thresholds.
Bias	Is to reduce the systematic or persistent distortion of any measurement process, bias will be minimized by using professional and experienced staff to collect and analyze data.
Accuracy	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 survey.
Representative	Monitoring location were chosen based on proximity and potential impact from the restoration activities with emphasis on capturing both an upstream and downstream area for each restoration activity.
Comparability	Monitoring locations will be monumented for repeat sampling events to compare pre- and post-treatment 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 and completed as needed for project record.
Sensitivity	Flow meters and other methods of monitoring are being monitored at a scale that will be able to show a measurable difference. For example, flow results will be measured at a scale that the sensitivity will show even a small absolute amount of change that can be detected by an increase or decrease in that measurement. To augment this flow information metrics of simply presence or absence of water will help refine metric sensitivity.

**A.8 Special Training/Certification**

Data collection and monitoring for this project will be implemented by HPWA with oversight from the SWQB Project Officer. HPWA staff conducting work for the project will review this QAPP, applicable SWQB SOPs and sign the QAPP acknowledgment statement prior to initiating any work for the project. HPWA staff will be responsible for ensuring that the requirements of this QAPP are implemented, and are responsible for sub-contractors and volunteer’s adherence to the QAPP. The signed acknowledgment statements will be kept on file with original QAPP by the QAO. If at any point during the course of the project HPWA staff do not fully understand data collection methods or procedures, HPWA staff will reach out to SWQB Project Officer, prior to data collection, for clarity and guidance.

**A.9 Documents and Records**

The SWQB Project Officer will make copies of this approved QAPP and any subsequent revisions available to the Project Manager. The Project Manager is responsible for distributing copies of this approved QAPP

and any subsequent revisions 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 Project Manager and Project Coordinator 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 and 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 the HPWA 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 HPWA computer and on a separate external backup hard drive at the HPWA office. Hard copy project documents will be kept in a project folder in a file cabinet at the HPWA office. All hard copy documents will be digitized and stored on a HPWA computer and backup hard drive (see Table 5). Copies of the data will be distributed by Project Manager to NMED SWQB Project Officer after each field season by the end of December.

**Table 5. Data Records for the Project**

Document	Type of Form	Storage Location	Field Sheet Used
<b>QAPP</b>	Electronic (.doc) & Hard Copy	Hard drive and in file cabinet.	EPA Requirements for Quality Assurance Project Plan. EPA QA/R-5.
<b>Sonde Grab Data (pH, DO, turbidity, specific conductance)</b>	Electronic (.xls)	Hard drive	SWQB Stream Field Data Form (Appendix A)
<b>Flow Data</b>	Electronic (.doc)	Hard drive	Stream Flow Field Sheet (Appendix B)
<b>Total Phosphorus, Nitrate+Nitrite as N and TKN)</b>	Hard copy and Electronic (.doc)	Hard drive	SWQB Stream Field Data Form (Appendix A)
<b>Physical Habitat Measurements</b>	Electronic (.doc)	Hard drive	Physical Habitat Field Sheets (Appendix C)
<b>E. coli</b>	Electronic (.doc)	Hard drive	SWQB Stream Field Data Form (Appendix A)
<b>Photos</b>	Electronic (.jpg)	Hard drive	Permanent Photo Point Record. Appendix I <i>"Let the Water do the Work"</i>
<b>Interim and Final Reports</b>	Electronic (.doc) & Hard Copy	Hard drive	NA

HPWA Records	Reporting Units	Transferred to SWQB	Form used for data records transfer	Type of file
<b>Nitrate +Nitrate as Nitrogen (N)</b>	mg/l	yearly by the end of December	SWQB Data Submittal Form	excel
<b>TKN</b>	mg/l	yearly by the end of December	SWQB Data Submittal Form	excel
<b>E. coli</b>	mpn/100ml or cfu/100ml	yearly by the end of December	SWQB Data Submittal Form	excel
<b>Physical Habitat Measurements</b>	see SWQB SOP 5.0	yearly by the end of December	Electronic Physical Habitat Field Forms	excel
<b>Photos</b>	NA	yearly by the end of December	Field sheets in Appendix I of <i>Let the Water do the Work</i>	jpeg. and word documents

## GROUP B: DATA GENERATION AND ACQUISITION

### B.1 Sampling Design

Locations for monitoring sites were determined prior to any monitoring and were chosen based on proximity and potential impact from the restoration activities with emphasis on capturing both an upstream and downstream area for each restoration activity. Pre-treatment monitoring is planned to be conducted at seven (7) sites in beginning Fall 2021. Post-treatment monitoring is planned for the same seven (7) sites beginning Summer 2022. Both Nutrient and E. coli samples will be delivered to the Specimen and Receiving Section of the State of New Mexico Scientific Laboratory Division (SLD) for processing before analyses by SLD. These data will be examined at the end of the project to determine the load reduction achieved from implementation projects. The load reduction will be determined based on the models used in the “Watershed Based Plan for the Mora River Upper Canadian Plateau” (Appendix C. Management and Restoration Measure Efficiencies pages 164-165).

Conrad Greaves and Patrick Gutierrez will be responsible for conducting all monitoring and all related data collection efforts. The study design consists of seven (7) monitoring sites upstream and downstream of tributary confluences to determine the inputs of tributaries, upstream and downstream of areas with greater population density (Watrous, NM) to determine the inputs of human impacts and finally upstream and downstream of wetlands to ascertain rates of denitrification. Monitoring locations were identified during the monitoring phase for the Watershed Based Plan. Monitoring will be conducted at locations representative of ambient stream conditions, generally in the transition between a riffle/run and a pool, or at the toe of a pool, rather than in shallow riffles or deep pools.

Field team will collect nutrient samples in accordance with SWQB SOP 8.2, Chemical sampling in Lotic Environments. All applicable sections of SWQB SOP 8.2 will be adhered to during the nutrient sample run. A sample run is defined as a 24-hour period where all seven (7) monitoring sites were sampled or visited. One (1) nutrient grab sample will be collected in the appropriate sample container (See Table 7) at each of the seven (7) monitoring sites during a sample run (if stream flow is sufficient to obtain sample). In addition to the nutrient sample, a blank sample will be collected during the sample run at one of the initial monitoring sites. More information regarding blank collection is provided in the Quality Control Section of this QAPP. Monitoring is planned to be conducted at the seven (7) sites detailed in Figure 4: Fall 2021, Spring 2022, **Summer/Fall 2022 (Junewo 15 to November 1)**, and Spring 2023. The nutrient grab sample collected at each of the monitoring sites will be analyzed for nitrate (NO<sub>3</sub>) + nitrite (NO<sub>2</sub>) as nitrogen (N),

total Kjeldahl nitrogen (TKN) and total phosphorus (TP) at the certified laboratory (see Analytical Section of the QAPP, B4).

Field team will collect *E. coli* samples in accordance with SWQB SOP 9.1, Bacteriological Sampling. All applicable sections of SWQB SOP 9.1 will be adhered to during nutrient sample run. A sample run is defined as a 24-hour period where all seven (7) monitoring sites were sampled or visited. An *E. coli* grab sample will be collected at each of the seven (7) monitoring sites (Figure 4) during a sample run (if stream flow is sufficient to obtain sample). In addition to the *E. coli* sample, a blank sample will be collected during the sample run at one of the initial monitoring sites, more information regarding blank collection is provided in the Quality Control Section of this QAPP. A minimum of two (2) different sample runs will occur during the contractual period. Sample runs will consistently occur during same month for each monitoring year. *E. coli* samples will typically be collected in conjunction with nutrient grab samples; however, the sampling will only be completed in Fall 2021 and Fall 2022.

Field team will collect instantaneous measurements with sonde (YSI 556 MPS) at each of the seven (7) monitoring sites in accordance with the SWQB SOP 6.2, Sonde Deployment. Instantaneous measurements collected during sonde deployment will occur during sample run for nutrient sample collection. The sonde will provide instantaneous measurement for the following field parameters during sampling events: temperature, pH, specific conductivity, dissolved oxygen concentration, and percent dissolved oxygen, and barometric pressure. Stream side turbidity will be collected by grab sample and analyzed with a Hach 2100P. HPWA staff will follow all manufacture calibration procedures prior to data analysis. All data provided by turbidity meter will only be used as educational or will be used to provide a broad overview of water quality in the stream.

Field team will collect Stream flow at all seven (7) monitoring locations after instantaneous sonde measurements have been collected at each site. Stream flow will be collected in accordance with the SWQB SOP 7.0, Stream Flow Measurement. Stream flow will be collected with a USGS Pygmy Current Meter, if no flow is observed staff will note in field form.

Field team will collect physical habitat measurements before and after in-stream BMP implementation in accordance with the SWQB SOP 5.0, Physical Habitat Measurements. Field team will consist of at least two persons at all times while conducting data collection, if possible, the two team members will remain consistent for all data collection events. The field team will perform one (1) replicate pebble count each year, during regular data collection surveys, for quality assurance purposes. Physical habitat measurements include cross sectional and thalweg (longitudinal) profiles, pebble counts, percent canopy cover measurements and slope. All physical habitat measurements will be collected at in-stream BMP implementation sites before and after BMP implementation. If time permits and resources allow measurements may be taken at BMP implementation sites where plantings occurred along banks. Cross-sections will be monumented with rebar pins (right bank and left bank) for repeatability. Rebar locations will be recorded with a GPS unit for accuracy and verification for later sampling events. The reach layout and sample area will be setup according to the Reach Layout Section of SOP 5.0. Table 2 - Location and Intervals of Transects for Surveys Activities, located in SWQB SOP 5.0, provides examples of reach layout determination for physical habitat measurements. See Table 6 in this QAPP for more information regarding frequency of sampling.

Photographic documentation will be done in conjunction with physical habitat measurements. Field team will conduct photographic documentation in accordance with Let the Water Do the Work (Zeedyk, et al,

2009). Photographic documentation will use rebar pins established from geomorphological surveys as guidance for establishing permanent monitoring locations for phot points.

A DO logger will be deployed at the bottom of the assessment unit (NM-2305.3.A\_00) or the most downstream monitoring site (MR1 or MR1A) on the Mora River if time, resources, and equipment allow. The logger will be deployed during the growing season for at least 72 hours, with a maximum interval of one hour between data collection points. The growing season is defined in the NMED SWQB Comprehensive Assessment and Listing Methodology found at <https://www.env.nm.gov/surface-water-quality/calm/>. For monitoring sites < 7500ft, in Omernick Ecoregion 20, 21, 22, and 23 the growing season would be from June 15 to November 1. For monitoring site > 7500ft, in Omernick Ecoregions 22 and 23, the growing season would be from July 1 to October 15.

**Table 6. Project Monitoring Specifics**

Responsible Party	Monitoring	Location	Frequency
<b>Contractor/ Cooperator</b>	Type of Monitoring	Monitoring Station ID	Frequency interval
<b>HPWA</b>	Nutrient Sampling (analysis for: nitrate + nitrite as N, total phosphorus and TKN)	MR1, MR1A, MR1B, MR2, MR3, MR3B, MR4A	Pre-treatment monitoring is planned to be conducted two (2) times at seven (7) sites between 2021 and 2022. Post-treatment monitoring is planned to be conducted two (2) times at the same seven (7) sites between 2022* and 2023. *See content in bold located in the Sampling Design Section of this QAPP for a more details regarding frequency and timing of samples.
<b>HPWA</b>	<i>E coli</i>	MR1, MR1A, MR1B, MR2, MR3, MR3B, MR4A	Pre-treatment monitoring is planned to be conducted one (1) time at seven (7) sites Fall 2021. Post-treatment monitoring is planned to be conducted one (1) time at the same seven (7) sites Fall 2022. See content in Sampling Design Section.
<b>HPWA</b>	Sonde Deployment (grab samples)	MR1, MR1A, MR1B, MR2, MR3, MR3B, MR4A	In conjunction with nutrient and <i>E. coli</i> sampling
<b>HPWA</b>	Surface Flow Monitoring	MR1, MR1A, MR1B, MR2, MR3, MR3B, MR4A	In conjunction with nutrient and <i>E. coli</i> sampling, at a minimum



<b>HPWA</b>	Physical Habitat Measurements	at all in-stream BMPs implementation sites	Pre-treatment monitoring is planned to be conducted at in-stream BMP implementation sites between 2021 and 2022. Post-treatment monitoring is planned to be conducted at the monumented location established during pre-treatment monitoring in Fall 2022 or Summer 2023.
<b>HPWA</b>	Photo Documentation	MR1, MR1A, MR1B, MR2, MR3, MR3B, MR4A	In conjunction with physical habitat measurements data collection, at a minimum

## B.2 Sampling Methods

Nutrient Sampling will be conducted in accordance with SWQB SOP 8.2, Chemical Sampling in Lotic Environments. All applicable sections of SWQB SOP 8.2, for nutrient sampling will be adhered to during nutrient sample collection. Nutrient samples will be analyzed at SLD in Albuquerque, NM. The SWQB SOP 8.2 Chemical Sampling in Lotic Environments is available at: <https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/82ChemicalSamplingSOP4-11-2016.pdf>. HPWA staff will reach out to the NMED SWQB Project Officer for clarity and guidance if needed.

*E. coli* Sampling will be conducted in accordance with SWQB SOP 9.1, Bacteriological Sampling. All applicable sections of SWQB SOP 9.1 will be followed. *E. coli* samples will be analyzed at the SLD in Albuquerque, NM. SWQB SOP 9.1 is available at: <https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/9-1-Bacteriological-Sampling-20201117-approved.pdf>. HPWA staff will reach out to the NMED SWQB Project Officer for clarity and guidance if needed.

Sondes will be deployed at monitoring locations in accordance with the SWQB SOP 6.2 Sonde Deployment. Sonde Deployment protocol will follow the Step-by-step Process section identified in SOP 6.2 and will gather instantaneous measurement in accordance with section 6.1.2. Sonde Deployment protocol will follow the Step-by-step Process section identified in SWQB SOP 6.2 and will gather instantaneous measurement described in <https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP-6-2-Sonde-Deployment-20180718.pdf>. HPWA staff will reach out to the NMED SWQB Project Officer for clarity and guidance if needed.

The calibration of the Sondes will be calibrated according to SOP 6.1 Sonde Calibration and Maintenance before and after deployment, using the methodologies described in <https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/6.1-SOP-Sonde-Calibration-and-Maintenance-20210205-approved.pdf>. HPWA staff will reach out to the NMED SWQB Project Officer for clarity and guidance if needed.

Stream flow will be collected in accordance with SWQB SOP 7.0, Stream Flow Measurement. Stream flow will be collected in accordance with SWQB SOP 7.0, Stream Flow Measurement [https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP\\_7.0\\_Discharge\\_4-7-15.pdf](https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP_7.0_Discharge_4-7-15.pdf).

Physical Habitat Measurements will be collected using the SWQB SOP 5.0, Physical Habitat Measurements. All measurements will be collected in their entirety according to SOP 5.0. SWQB SOP 5.0

is available at: <https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/5.0-Physical-Habitat-SOP-20190917b-approved.pdf>. HPWA staff will reach out to the NMED SWQB Project Officer for clarity and guidance if needed.

Photographic documentation will be collected using the protocols identified in Let the Water Do the Work (Zeedyk, et al, 2009). Photographic documentation showing increased wetted perimeter and locating where wetland vegetation is currently and how it changes over time.

DO logger will be calibrated and deployed according to SWQB SOP 6.1 Sonde Deployment and 6.2 Sonde Calibration and Maintenance. HPWA will reach out to the SWQB Project Officer if needed.

STEPL — modeling will be completed in accordance with the instructions provided on the US EPA webpage. 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 Spreadsheet and will require additional field measurements inputs collected during the course of this project.

### B.3 Sample Handling and Custody

Sample handling and custody will be done in accordance with SWQB SOP 8.2, Chemical Sampling in Lotic Environments section 6.4 Handling, Packaging and Transporting Samples. See Table 7 in Section B4 of this QAPP.

### B.4 Analytical Methods

Nutrient analysis of water grab samples collected on the Mora River will be analyzed at the SLD in Albuquerque, NM. Nutrient analysis consist of analyzing water samples for Total Phosphorus, Total Kjeldahl Nitrogen and Nitrate + Nitrite as Nitrogen (N). Analysis will be conducted by trained SLD staff and will be analyzed using standardized EPA laboratory protocol for Total Phosphorus, Total Kjeldahl Nitrogen and Nitrate + Nitrite as N. Analytical instruments and equipment used by SLD laboratory are calibrated prior to each instrument analysis batch using manufacturer’s recommended procedures and the guidelines provided in the Handbook for Analytical Quality Control (EPA 1979). All calibrations procedures are validated and documented by the SLD laboratory and are described in the laboratory’s QAPP or equivalent. Table 7 provides information regarding SLDs, analysis methods for analytes, method reporting limits, and required reporting units. Table 7 also provides information on proper sample container, preservative and hold time for each analyte.

**Table 7. Methods, Detection Limits, Reporting Units, Sample Containers, Preservatives and Hold Times**

Analyte	Method	MRL	Reporting units	Sample Container	Preservative	Hold Times
<b>Nitrate + Nitrite as Nitrogen</b>	EPA 353.2	0.05 mg/l	mg/l	1-quart polyethylene cubitainer	2.0 ml concentrated sulfuric acid, on ice, approximately 6°C	28-days

<b>Total Phosphorus (low concentration analysis)</b>	EPA 365.4	0.01 mg/l	mg/l	1-quart polyethylene cubitainer	2.0 ml concentrated sulfuric acid, on ice, approximately 6°C	28-days
<b>TKN</b>	EPA 351.2	0.2 mg/l	mg/l	1-quart polyethylene cubitainer	2.0 ml concentrated sulfuric acid, on ice, approximately 6°C	28-days
<b><i>E. coli</i></b>	IDEXX	< 0 mpn/100ml	mpn/100 ml or cfu/100ml	120 ml polypropylene bottle	Sodium thiosulfate, on ice, less than 10 °C	24-hours non-regulatory  8-hours for regulatory

## B.5 Quality Control

Quality control (QC) activities are technical activities, including data verification and validation procedures, that measure the attributes and performance of a process, item or service against a defined standard performed on a routine basis to quantify the inherent variability of any environmental data measurement activity. The purpose of implementing QC activities is to reduce variability and uncertainty 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. Quality Control mechanisms are implemented as described under the Quality Objectives and Criteria for Measurement Data as well as the SWQB SOPs, and the phot-documentation procedure identified under this QAPP.

Field blanks will be collected using deionized water (at least ASTM Type II or cleaner) for both nutrient and *E. coli* samples analyzed at the SLD. A Field blank is defined as:

- Field Blank – A sample of analyte-free water that is prepared in the field using a clean sample container with an aliquot of deionized water. Field blanks are collected for nutrients and *E. coli* and are treated as regular samples in all respects, including exposure to sampling station conditions, storage, and preservation. The purpose of these samples is to determine if any of these field conditions or processes have caused sample contamination. A minimum of one field blank is collected per sampling run, with an additional blank collected for each 10th sample (for a minimum 10% collection rate). For example, a run consisting of nine samples would have one blank collected, while a run consisting of eleven samples would have two blanks collected.

One (1) field blank will be collected for nutrients and one (1) field blank will be collected for *E. coli* at the initial (within first three monitoring sites) monitoring sites during each sample run. Field blanks will be analyzed by laboratory as regular field samples. This project defines a sampling run (or run) as a period of

time used to represent the most common collecting period or grouping of sampling activities indicative of project sampling operations. Typically, most samples are collected during multi-day collection events that depart and return to the office in a given week (M-F). Blanks associated with a run are assumed to collectively represent a group of samples where the staff, equipment, vehicle, reagents, preservation, and storage remain constant.

Physical Habitat Measurement quality control will be maintained by following the procedures in SWQB SOP 5.0, maintaining team staff consistency and by field staff performing one (1) pebble count replicate per field season.

### **B.6 Instrument/Equipment Testing, Inspection and Maintenance**

Equipment requiring maintenance, testing and inspection are the Sonde meter, DO logger, flow meter and gps device. These meters will be tested during calibration for accuracy and function according to requirements and procedures are specified in the SWQB SOPs noted in the instrument/equipment Calibration and Frequency section of this report. The Sonde meter will be visually inspected for damage before and after each use and if any maintenance is necessary, it will be completed prior to the next monitoring trip. The velocity meter will be tested, inspected, and maintained in the same manner. If maintenance is required, it will be done so according to the manufacturer's protocols. The GPS unit will be inspected before leaving the office to collect field measurements.

### **B.7 Instrument/Equipment Calibration and Frequency**

It should be possible to show that all data was collected with monitoring devices that can be shown to have been properly calibrated. For this project, specific calibration requirements apply to the Sondes, DO loggers and flow meters. The calibration of the Sondes and DO logger will be calibrated according to SOP 6.1 Sonde Calibration and Maintenance before and after deployment, using the methodologies described in [https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP-6\\_1\\_20180122.pdf](https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP-6_1_20180122.pdf) .

For this project, specific calibration requirements apply to velocity flow meters, and they will be calibrated according to SOP 7.0 Flow. The calibration of flow velocity meters will be checked before each field day (before deployment and after retrieval) using the methodology described in the [https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP\\_7.0\\_Discharge\\_4-7-15.pdf](https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/SOP_7.0_Discharge_4-7-15.pdf) .

The gps unit will be checked for accuracy as described in instruction manual for the unit, prior to use.

A calibration record book will be maintained for each device throughout the life of the project. This data will also be maintained electronically in an MS Excel file spreadsheet. Documentation of calibration and verification will be maintained by Project Coordinator, Conrad Greaves.

### **B.8 Inspection/Acceptance for Supplies and Consumables**

Consumables that have potential to affect the quality of data collected during project are calibration standards solutions and grab sample containers for nutrient sampling. HPWA staff will visually inspect calibration standard solutions for contamination and ensure expiration date has not been exceeded before each use. Calibration standard solution will be stored in conditions as specified by manufacturer specifications. This project will use new grab sample containers with preservatives added, provided by SLD, at each monitoring site for each sample run and handle container in accordance with SWQB SOP 8.2 Chemical Sampling in Lotic Environments, section 6.0 Collecting Water Samples. The SLD implements a

quality assurance system which requires specific quality control mechanisms for all sample containers and preservatives. SLD is the Laboratory used by the Monitoring Section of the SWQB and is a EPA certified.

### **B.9 Non-direct Measurements**

For this project, non-direct measurements are not considered to be integral to fulfilling the stated objectives. However, some non-direct measurements have proven useful in post-data collection analysis and putting the data into context within the whole watershed. The primary source of non-direct measurements will come from the use of existing aerial and satellite photos of the project area to determine historic channel locations. The most common and anticipated source is the National Agriculture Imagery Program (NAIP) imagery from the US Department of Agriculture for New Mexico. The specifications for this imagery are documented on the internet at the following location: <https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/naip-imagery/>.

Data collected from past Clean Water Act projects (CWA) and NMED SWQB River Stewardship projects in development and update to the Watershed Based Plan for the Mora River Upper Canadian Plateau may provide useful information in project development for this Phase 1B project. Data collected for past CWA projects were collected under EPA approved project-specific QAPPs and are considered to be usable for this project. Data collected for past River Stewardship projects were conducted under approved NMED SWQB Scope of Work contracts and are considered to be usable for this project. If non-direct measurements (data) from past projects (CWA and River Stewardship) are questionable or uncertainties arise, the data will not be used for the Phase 1B project.

### **B.10 Data Management**

HPWA will be responsible for data management. All data will be converted to electronic format, stored, and backed up by HPWA. Computer hard drives are backed up at the end of every season or will be backed up on external hard drives, respectively. Original hardcopy project document data sheets will be kept by HPWA. HPWA Project Manager will ensure original hardcopy project documents are scanned and then transferred to the SWQB Project Officer at the end of every field season.

The Project Officer will make copies of this QAPP and any subsequent revisions available to all individuals on the distribution list.

All personnel involved with data collection will use a bound field notebook to collect in-field data. Field personnel will submit copies of field notes and samples to the Project Coordinator at the end of each field survey. Metadata associated with analytical samples will be documented in the field notebooks and on the chain of custody sheets which will be used to transport the samples to the analytical laboratory. Metadata will include, at a minimum, the date, time, ambient temperature, staff present during sampling, location with latitude and longitude coordinates, media collected, volume collected, sample reference ID, parameter sampling for, as well as preservation used. The Project Coordinator will take analytical samples to the laboratory for analysis along with completed chain of custody documents; compile field notes; and provide copies of each to the Project Officer who will record and file the documents in the project file at the SWQB office in Santa Fe, NM.

Analytical reports and associated laboratory QA documents will be submitted to the Project Coordinator who will provide a copy to the SWQB Project Officer for the project file. HPWA Project Manager/Coordinator will ensure that the laboratory is able to analyze nutrients in a range below the

established nutrient threshold and includes the method detection limits, laboratory minimum reporting limit (MRL), sample detection limits (SDL) for laboratory analysis performed on nutrient grab samples obtain for this project. Laboratory should also provide any other reporting definition pertaining to results from analysis done on nutrient samples. HPWA Project Manager/ Coordinator will also require the laboratory to report results of nutrient and *E. coli* analyses in an electronic data deliverable format as well as a narrative report. 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 HPWA.

All final reports generated by the SWQB Project Officer will be provided to EPA and NMED and a hard copy will be placed in the project file within the SWQB WPS network server. Project documents include this QAPP, field notebooks, calibration records, validation and verification records, and sample collection data, records of analytical data in hard copy or in electronic form and QC records. Also included are project interim and final reports. Documents held by the Project Officer will be maintained in accordance with the requirements of the Bureau's QAPP Documentation and Records section.

The electronic data (nutrients, *E. coli*, physical habitat measurements, and DO data) will be saved in the project file on the SWQB server by SWQB Project Officer upon receiving data.

Data will be sent to the SWQB Project Officer by the end of each field season by the Project Coordinator of HPWA typically by the end of each field season. Upon receiving data, the SWQB Project will store data on SWQB network drive. 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**

### **C.1 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.

### **C.2 Reports to Management**

Annual reports will be submitted by the Hermit's Peak Watershed Alliance, 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 June 30, 2023. 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**

### **D.1 Data Review, Verification and Validation**

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 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 to determine the potential cause and usability. 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.

### **D.2 Validation and Verification Methods**

HPWA will ensure that valid and representative data are acquired. Verification of field sampling and analytical results will be performed by HPWA in accordance with the SWQB SOP 15.0 for *Data Verification and Validation*. 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 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.

### **D.3 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 the development of the Watershed Project Implementation for the Mora River Phase 1B. The quality of the data will be adequate to provide a high level of confidence in determining whether the Watershed Project Implementation for the Mora River Phase 1B 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.

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## Acknowledgement Statement



New Mexico Environment Department Surface Water Quality Bureau

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**Watershed Project Implementation for the Mora River-Upper Canadian Plateau Phase 1B, NMED  
SWQB Grant No. 667-429-2E**

**Quality Assurance Project Plan Acknowledgement Statement**

This is to acknowledge that I have received a copy (in hard copy or electronic format) of the Quality Assurance Project Plan for the Watershed Project Implementation for the Mora River-Upper Canadian Plateau Phase 1B, NMED SWQB Grant No. 667-429-2E .

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

\_\_\_\_\_  
Name (Please Print)

\_\_\_\_\_  
Date  
Return to SWQB Project Officer Emily Toczek