New Mexico Rapid Assessment Method for Headwater Slope Wetlands, and USACE NMRAM Phase 3, New Mexico

CWA Section 104(b)(3) Wetlands Development Grant

Assistance Agreement No. CD# 01F467-01-0 (FY2018)

Quality Assurance Project Plan

Submitted by:
New Mexico Environment Department
Surface Water Quality Bureau

A PROJECT MANAGEMENT

A1 Title and Approval Sheet

Maryann McGraw Digitally signed by Maryann McGraw Date: 2022.05.16 08:12:31 -06'00'
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Maryann McGraw
Wetlands Program Coordinator, SWQB

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Project Officer, WDAS, EPA Region 6

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Nelly Smith
Chief, State and Tribal Programs Section, WDAS, EPA Region 6

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List of Abbreviations

ABS	Above Sea Level
CD	Compact disc
CRAM	California Rapid Assessment Method
CWA	Clean Water Act
DOQQ	Digital Orthophoto Quarter Quadrangles
DOT	Department of Transportation
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HGM	Hydrogeomorphic Method
HUC	Hydrologic Unit Codes
LLWW	Landscape Position, Landform, Water Flow Path, Waterbody Type
MA	Master of Arts
MQO	Measurement Quality Objectives
MS	Master of Sciences
NA	Not Applicable
NEPA	National Environmental Policy Act
NHNM	Natural Heritage New Mexico, University of New Mexico
NMED	New Mexico Environment Department
NMRAM	New Mexico Rapid Assessment Method
NWCA	National Wetlands Condition Assessment
NWI	National Wetlands Inventory
PO	Project Officer
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
RA	Rapid Assessment
RID	Request Identification Number
SA	Sample Area
SOP	Standard Operating Procedures
SQUID	Surface Water Quality Information Database
SWQB	New Mexico Environment Department Surface Water Quality Bureau
US EPA	United States Environmental Protection Agency
WOI	Wetland of Interest
WPS	Watershed Protection Section
WPC	Wetlands Program Coordinator
WPO	Wetlands Program Project Officer

A3 Distribution List

This EPA-approved Quality Assurance Project Plan (QAPP) signed original will be kept on file at SWQB and a copy will be kept on file at the lead contractor's office (Natural Heritage New Mexico, University of New Mexico (NHNM)).

The Wetlands Program Coordinator (WPC) 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 (electronic or hard copy) will be collected by the SWQB WPC and will be given to the QA Officer for filing with the original approved QAPP. The NHNM Director will ensure that any NHNM other staff involved in data collection or analysis for this project have access to a copy of this QAPP, review its contents, and follow its quality assurance procedures.

Table A4.1 lists the roles and responsibilities of persons that will collect and/or use the information gathered for the classification verification, wetlands assessment, and multi-metric analyses.

Table A4.1: Distribution List with Roles and Responsibilities

Name	Organization	Role	Responsibilities	Contact Information
Abe Franklin	SWQB	Watershed Protection Section Program Manager	Review of QAPP.	(505) 946-8952 Abe.franklin@state.nm.us
Maryann McGraw	SWQB	Wetlands Program Coordinator; Project Oversite; File Manager	Principal Investigator, Assessment Team, assist in site selection, metrics selection, protocol and data management, data transfer and distribution activities. Coordinate technical advisory committee activities and serve as a member, Pilot Study. Contribute to NMRAM Field Guide. Maintain Wetlands Program project files. Review of final project report and key deliverables including Field Guide and Manual. Liaison to EPA.	(505) 490-3135 maryann.mcgraw@state.nm.us
Miguel Montoya	SWQB	QA Officer	Review and approval of QAPP, QA audits, as needed, to assure adherence to the approved QAPP.	(505) 819-9882 miguel.montoya@state.nm.us

Name	Organization	Role	Responsibilities	Contact Information
Emile Sawyer	SWQB	Data Collection Team	Serve on technical advisory committee, assist with field data collection.	(505) 819-9891 emile.sawyer@state.nm.us
Davena Crosley	SWQB	Data Collection Team	Serve on technical advisory committee, assist with field data collection.	(575) 636-3425 davena.crosley@state.nm.us
Dustin Nelson	SWQB	Data Collection Team	Serve on technical advisory committee, assist with field data collection.	(505) 469-6186 dustin.nelson@state.nm.us
Esteban Muldavin	NHNM	Rapid Assessment Contractor	Assessment Team Leader, assessment design, site selection, protocol and data management, multi-metric analysis, data transfer and distribution activities, contribute to NMRAM Manual, and Field Guide.	(505) 277-3822 ex 228 muldavin@unm.edu
Elizabeth Milford	NHNM	Rapid Assessment Contractor	Project Coordinator, Assessment Team, management of NHNM contributing staff compilation of GIS layers for site selection, assist in site selection, protocol and data management, data transfer and distribution activities, Pilot Study details, contribute to NMRAM Manual, Field Guide, image classification, GIS management.	(505) 277-3822 ex 227 emilford2@gmail.com
Yvonne Chauvin	NHNM Senior Biologist	Rapid Assessment Contractor	NMRAM Data Collection and daily QA Crew Leader.	(505) 277-3822 ex 227 ydchauvin@gmail.com
Amy Urbanovsky	NHNM Biologist	Rapid Assessment Contractor	Assist in NMRAM data collection and classification verification and alternate Crew Leader, data transfer	(505) 277-3822 ex 227 amy.urbanovsky@gmail.com
Kyla Chandler	U.S. EPA	EPA Project Officer	QAPP review and approval	(214) 665-2166 Chandler.Kyla@epa.gov
Nelly Smith	U.S. EPA	EPA Management	QAPP review and approval	(214) 665-7109 Smith.Nelly@epa.gov

A4 Project Task Organization

A project organizational chart (Figure A4.1) displays hierarchy of the project.

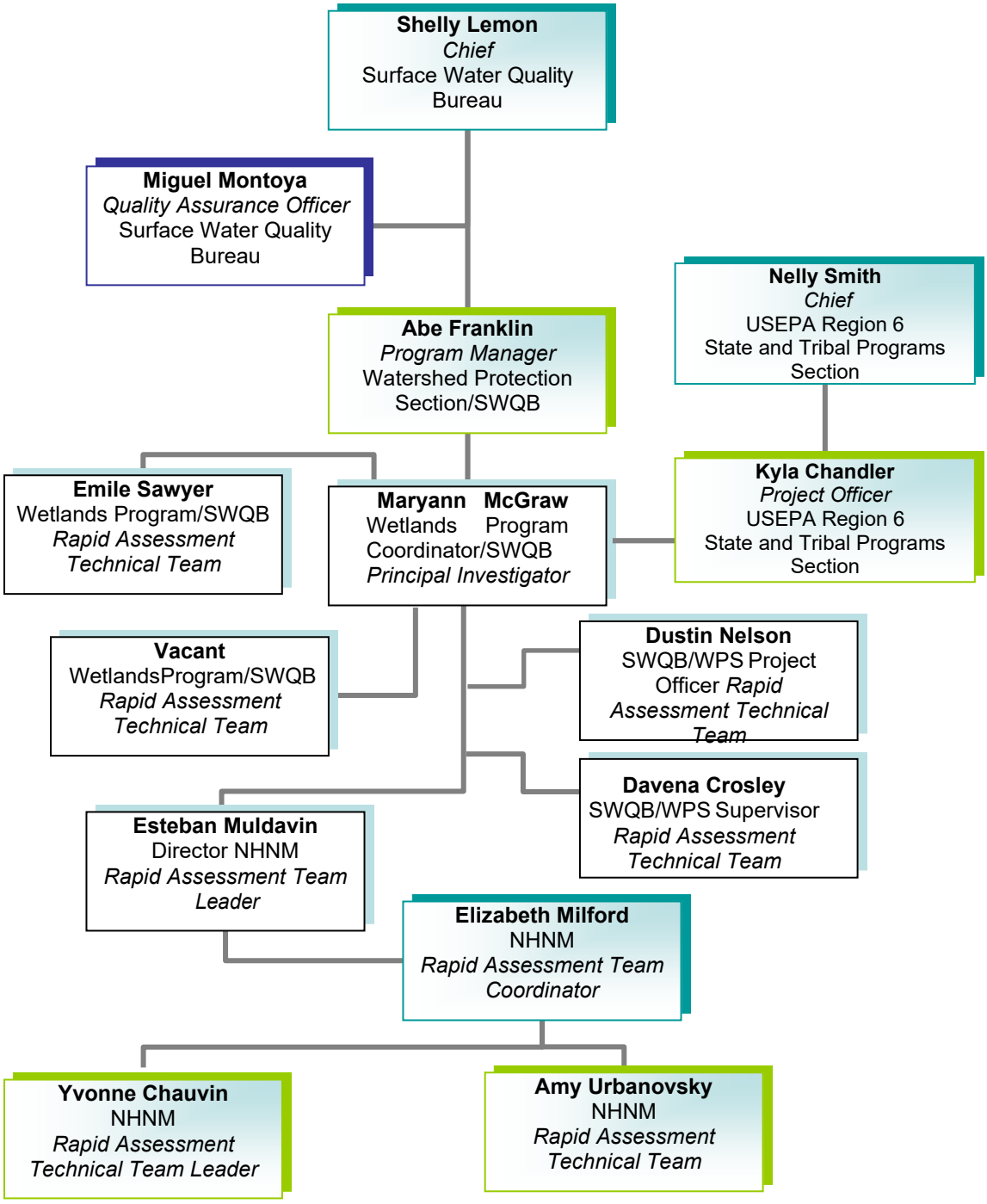

Figure A 4.1: Organizational Chart of Key Personnel.

A5 Problem Definition/Background

This rapid assessment project is designed to develop and test metrics that will assess the ambient condition of a subset of the Slope Class of wetlands (Brinson et al. 1993) located in the headwaters of perennial streams in Northern New Mexico. Through the process of field sampling and evaluation of protocols, NMRAM can be tested and improved before it is more broadly applied. The "Reference Domain" which is the geographic area in which the subclass of wetlands can be found and that this NMRAM is applicable is shown in Figure A6.1. As we test outliers beyond the current Reference Domain, we can expand the Reference Domain to include those geographic areas.

The headwater slope wetlands subclass is generally situated at the tops of watersheds and are critical to the functioning of entire river systems due to influences on downslope rivers and floodplains. Headwater slope wetlands are characterized by soils high in organic matter, important to the capture of water and storage of baseflow, unidirectional dispersed (rather than concentrated) flow from snowmelt and runoff spreading across the wetland surface, a groundwater component that safeguards wetland stability during drought, and palustrine emergent (marshy/wet meadow) vegetation. It is estimated that many high-elevation headwater valleys may have been characterized by expansive slope wetland marshes and meadows with unidirectional flow without active channels (except for short reaches with steeper elevational differences), and in some places these slope wetland-dominated valleys still exist. Baseflow from headwater slope wetlands often maintains cold temperatures necessary for cold water aquatic life downstream.

The purpose of defining a subclass and testing NMRAM within a select Reference Domain is to reduce the natural variability in wetland type as well as variabilities that occur with latitude, altitude, climate and geomorphology. The selection of Sample Areas (SA) for this project is intended for testing rapid assessment protocols based on valley characteristics, fen characteristics associated with headwater slope wetland complexes, floristic characteristics as well as the spectrum of ecological condition, representing the disturbance gradient from relatively undisturbed to highly degraded sites. The "disturbance gradient' is the basic underlying assumption that wetland condition within similar wetlands will vary along a gradient from the most pristine to the most degraded in response to anthropogenic disturbance.

Headwater slope wetlands in New Mexico are impacted and threatened by flow regulation by dams and impoundments, livestock grazing, hoof shear and trailing, major wildfires, agriculture and development, invasion of non-native species and encroachment of upland species, off-road vehicle ruts and roads. Legacy mining, logging, and grazing have impaired headwater slope wetlands from untreated headcuts, gullies, roads and trails, and vegetation removal that have dried out, continue to dry out, and in some cases obliterated these important wetland resources. Headwater slope wetlands that are impaired are more vulnerable to the impacts of flooding, fire and other extreme events associated with drought and a changing climate. The NMRAM is meant to provide a cost-effective tool to obtain information about the condition of wetlands that may be employed by a variety of users from different agencies and institutions. Additional objectives for NMRAM development include identifying and evaluating 1) abundance, distribution and condition of wetlands in the subclass within the region, including associated habitat, and other functions, above a threshold to maintain ecological services; 2) reference

wetland conditions within the subclass; 3) wetland protection needs for the subclass; 4) potential wetland restoration parameters and metrics that may be used to measure wetland restoration effectiveness and recovery; 5) the effects of environmental stressors within the wetlands; and 6) locations to serve as restoration opportunities for the subclass within the region.

The highest priority of the SWQB Wetlands Program is to develop methods for assessment that lead to protection and provide a benchmark for restoration of the State's wetlands resources. Without assessment information, wetlands resources will continue to decline from a variety of anthropogenic stressors. NMRAM refines the features and dynamics of reference standard conditions for each subclass, describes the extent and quantity of the targeted wetland type within a Reference Domain, and identifies the stressors and more broadly the potential drivers of ecological condition within the watershed that are causing wetland decline. These data provide justification for preventing or eliminating stressors that will ultimately lead to increases in wetland quantity and quality.

The development and use of the NMRAM for headwater slope wetlands, will provide for a robust wetlands assessment program in New Mexico and is consistent with our 2012 New Mexico Assessment and Monitoring Program Strategy for Wetlands. Training agency personnel, watershed group technicians, and other interested parties will accelerate the collection of relevant data and expand the use of NMRAM to other wetlands in the same selected subclasses. The development of a New Mexico wetlands database integrated with other water quality data ensures that these data are available to the state, to communities and EPA and will help provide the basis for wetlands water quality standards. These actions ensure the attainment of quality wetlands and increases in wetlands though improved restoration and protection.

Water resources assessments and management have become priority since the 1948 Federal Water Pollution Control Act and the 1972 amendments contained in the Federal Water Pollution Control Act. Rapid bioassessments (e.g., Barbour et al. 1999) have become standard approaches to evaluate the quality and biotic health of bodies of water and wetlands, and hydrogeomorphic assessments (e.g., Brinson et al. 1995; SSI) have become important tools for determining the hydrologic function of water bodies and wetlands. Wetland rapid assessment methods have evolved to combine aspects of both bioassessments and hydrogeomorphic assessments. Rapid assessment of wetlands assumes that condition can be evaluated based on a set of observable indicators or parameters and metrics, and that ecological condition varies across environmental stress gradients. Rapid assessments are based upon three basic principles: 1) assessments are relative to existing conditions only, 2) the method is rapid such that a team of three trained field technicians can complete the field assessment and data analysis for the assessment in one day, and 3) the assessment is based primarily on observed field conditions (Fennessy et al. 2004). NMRAM is being developed in accordance with these basic principles.

A6 Project and Task Description

This Project will employ the National Wetlands Inventory and collateral geospatial datasets to identify headwater slope wetland locations in Northern New Mexico within the upper Rio Grande, Rio Chama, and Canadian basins and in the Jemez Mountains (Figure A6.1). This subset (approximately 100 selected reference sites) will be assigned a preliminary ranking based on

best professional judgment and familiarity with the Wetlands of Interest (WOI) by members of the NMRAM Assessment Team.

In addition, NMRAM Assessment Team will review existing rapid assessment metrics and protocols from other rapid assessment methods. The NMRAM Assessment Team will then select a preliminary set of metrics and develop new ones specific to the subclass that will be reviewed and potentially tested for use in the NMRAM for headwater slope wetlands. This information (potential sites and preliminary set of metrics) will be presented to the Technical Advisory Committee (composed of local private, non-governmental organization and agency personnel familiar with headwater slope wetlands, and the Reference Domain) for their input on the metric selection, new metric development and preliminary rankings made by the NMRAM Assessment Team.

A Pilot Study will be conducted prior to metric selection in which a small set of headwater slope wetlands (5-10) representing the disturbance gradient, unique situations or the potential limits of the Reference Domain will be visited by the NMRAM Assessment Team consisting of NMED Wetlands Program staff, and the NHNM Assessment Team Members. During the Pilot Study preliminary rankings for these sites will be reviewed, the potential utility of possible metrics, and additional metrics that should be included, created, or modified to meet the objectives of the NMRAM for headwater slope wetlands will be discussed. Potential drivers of ecological condition and potential stressors will be noted and discussed. Notes, photographs and conclusions from each site are included in a Pilot Study Report.

From this Pilot Study, a draft set of GIS and field protocols and data sheets will be created for data collection at 20-40 carefully selected Sample Areas that represent the disturbance gradient within the Reference Domain. Data collection protocols will include geographic information system (GIS) map evaluations using different land feature and land use map layers (Level 1); and field-based rapid assessment (Level 2) of landscape, abiotic, and biotic attributes using the selected metrics and protocols identified in Section B of this QAPP.

Potential drivers of ecological condition will be identified, and stressor checklists will be developed or modified from existing NMRAM stressor checklists to be included in the NMRAM for Headwater Slope Wetlands data collection package. These checklists will be used during data collection to identify and evaluate the intensity of stressors on each Sample Area. Stressors are expected to have a negative effect on the condition of the site and may provide insight into the ecological integrity of the wetlands. A draft Risk Assessment based on the results of completion of the Stressor Checklist at each Sample Area can then be developed to identify the impacts to the resource. The intensity of stressors on the Sample Area helps define the level of risk by considering ecological condition against the severity of stressors. The stressor checklist is not included in the scoring and ranking of the Sample Area. Rather, it is a simple mechanism to increase visibility of risks and assist management decision making.

The draft set of NMRAM GIS and field metrics and field sheets will be used for data collection to:

- Verify the suitability of the selected metrics to inform condition of the headwater slope wetlands ecosystem
- Calibrate metric sensitivity relative to the range of variability in condition
- Determine the time and effort it takes to conduct NMRAM assessments
- Determine how stressor type and intensity relates to condition

- Determine the level of experience needed for a team to conduct the NMRAM
- Determine if the outcome provides the information needed to meet the SWQB project goals and NMRAM goals
- Determine site scoring and weighting factors based on condition

The data collection sheets include a Rank Summary Worksheet where the metric ratings are compiled, weighted by importance and sensitivity and summarized for each attribute. Using the attribute scores, the site is given an overall weighted Condition Rank, ranging from excellent to poor.

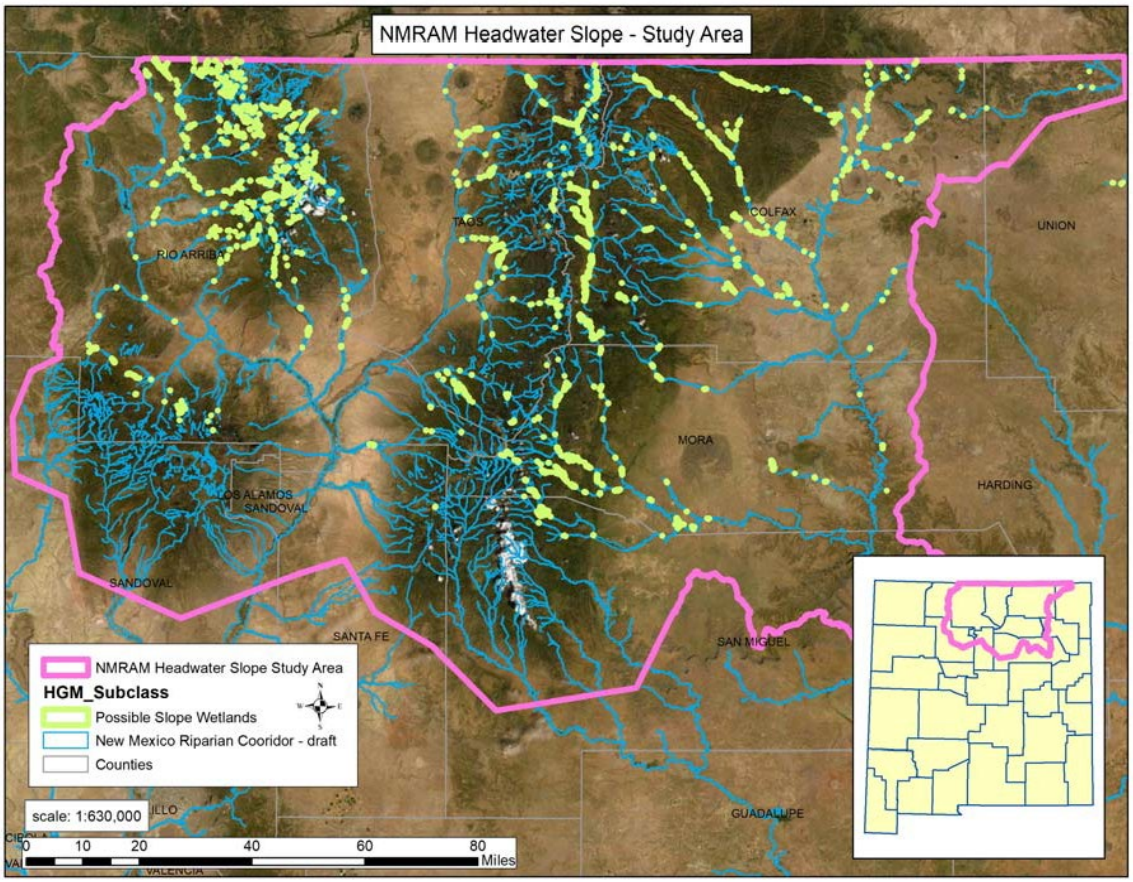

Figure A6.1: Map of the Reference Domain for developing New Mexico Rapid Assessment Method for Headwater Slope Wetlands.

NHNM and the WPC will conduct a training day in the field to ensure that all participants in data collection efforts are familiar with the requirements in the QAPP and understand the field protocols for collection of quality data from the selected sites. Safety protocols also will be reviewed on this training day. If safety measures are in place for conducting field work during Covid-19 statewide restrictions, those safety measures will be reviewed, and compliance will be required during any field training and data collection. The Crew Leaders will ensure that all field sheets and data are collected and recorded at the end of each field day and will back up all data sheets either by photographing or copying to a separate hard drive.

Once data collection is concluded, a review meeting will be scheduled for the NMRAM Assessment Team and the Data Collection Team to review the data collection efforts. The data will be entered into NHNM databases for review and multi-metric analyses to ensure the efficacy of all the selected metrics. Draft final NMRAM Manual update, Field Guide and data collection worksheets will be completed by NHNM and SWQB WPC and reviewed by project staff and prepared for end-user training. The current NMRAM Manual Version updated to include Headwater Slope Wetlands details and rationale, the Final Field Guide and Final Data Collection worksheets will be the final report of the project by NHNM. With the support and contributions of the WPC, NHNM will prepare these documents which will be reviewed and accepted by SWQB project staff and WPC.

A6.1 Project Schedule and Deliverables

The project schedule and deliverables are summarized in Table A6.1.1 by task, schedule, description and deliverables, and responsible party. The WPC will track project progress through invoice task completion reports associated with reimbursement requests and through Contractor quarterly progress reports to SWQB. If delays or other issues are recognized by NHNM, the WPC will be notified to develop contingency plans. Project delays will be documented and described in semi-annuals reports filed with the EPA.

Table A6.1.1: Tasks, Schedule, Deliverables, and Responsible Parties.

Task	Schedule	Description and Deliverable(s)	Responsible Parties
Literature review, geodatabase and map, wetlands classification and subclass description	Complete by December 2020	**A)** Compile background information on natural environments, land uses, actual/potential human-caused environmental impacts to headwater slope wetlands within the upper Rio Grande/Rio Chama/Canadian Watersheds and Jemez Mountains Reference Domain. The information search will include interviews with agencies and local active watershed groups. **B)** Analysis layers for the Reference Domain will be compiled by contractor into a GIS geodatabase including surface hydrology, watersheds, land use, digital elevation model, TMDL stream reaches, and infrastructure such as towns, roads, gas wells, & other available information. **C)** Completed NWI maps, Landscape Position Landform, Water Flow Path, Waterbody Type (LLWW) classification maps and functional correlation tables for the Rio Grande/Canadian Reference Domain will be used, and along with the geodatabase will be referenced to refine the wetlands classification for all headwater slope wetlands within the Reference Domain. **D)** After the draft classification is constructed, wetland sites that fit the headwater slope subclass and represent the range of condition will be selected, described and given a preliminary rank for rapid assessment development. Data for each site using standard map and GIS	McGraw, Milford, and Muldavin

Task	Schedule	Description and Deliverable(s)	Responsible Parties
		techniques will be analyzed 1) to systematically describe the subclass's typical range of physical characteristics that can be remotely observed, 2) to identify "outlier" sites that may not actually fit within the subclass, and 3) to populate an initial landscape Level 1 database of site characteristics.	
Review NMRAM Metrics and Field Guides and Conduct Pilot Study	A) Complete by June 2021 B) Complete Summer 2020	**A)** In a series of Assessment Team meetings, NMRAM metrics and protocols for headwater slope wetlands will be reviewed to determine if supplemental metrics, stressors and protocols are applicable. A draft set of metrics will be developed for testing, and will include supplemental and new metrics if necessary, protocols, stressor checklists and rating curves and other information. **B)** A 3-day pilot study will be conducted to review metrics, stressors, determine disturbance at potential data collection sites, view vegetation communities for cover types, answer questions and refine methods before field data collection is conducted.	McGraw, Milford, and Muldavin
Develop project QAPP	QAPP approved August 2020. Updated in May 2022.	An QAPP for EPA approval will be developed and updated as necessary. Any changes to procedures during NMRAM will be reflected by changes in the QAPP and submitted to EPA as amendments. The WPC will write and NHNM staff will contribute relevant information to the development of the QAPP.	McGraw, Milford, and Muldavin

Task	Schedule	Description and Deliverable(s)	Responsible Parties
Initiate piezometer location and install on headwater slope wetland sites	July 2020 – though life of project	Review potential locations for installing piezometers, determine data to be collected from each site, install piezometers and recording equipment, download data and analyze results, prepare report.	Sawyer, McGraw and Pierard
Continue Database (SQUID) Development	Ongoing through life of the project	Draft datasheet PDFs compatible with SQUID will be developed for data collection. After Manual and Field Guide revisions, datasheet PDFs will be finalized, and SQUID will be updated to accept headwater slope wetland data. Work will continue to include web-mapping features so users can upload wetlands location polygons and other spatially related features. Requirements and system design of web-features will be constructed and revised to ensure compatibility with NMED information systems and future EPA databases.	McGraw and Milford
Organize Advisory Committee and conduct Advisory Committee Meetings	1st Advisory Committee mtg complete by Spring 2022. 2nd Advisory Committee mtg Spring or Summer 2023	Invite Advisory Team members representing Upper Rio Grande/Rio Chama/Canadian Watersheds and Jemez Mountains Reference Domain, invite speakers, conduct 1-day introductory workshop, review metrics, subclass description, stressors and all aspects of NMRAM development to date. Conduct 1-2 follow-up metrics development advisory committee meetings. Distribute notes and draft metrics for participant review and comment.	Muldavin, Milford and McGraw

Task	Schedule	Description and Deliverable(s)	Responsible Parties
Prepare data collection materials and supplies, schedule entry, conduct rapid assessment field training	Due Spring 2022, and again in July-August 2023	Contractor will obtain sampling supplies, assemble data collection team and prepare for fieldwork. Field packets will be prepared for each site including SQUID-compatible field sheets, maps and directions to properties. Landowner information will be kept on file for future data collection and participation time will be tracked as project match. The Contractor and WPC will conduct 2-day field training for field data collection team and others listed in the QAPP to ensure that all protocols and safety measures are clearly understood and are consistent with the QAPP.	Milford, Urbanovsky, Chauvin, Crosley, Nelson, Sawyer, Muldavin, and McGraw
Collect data from 40 wetland sites, Database Entry	July-August 2022, and Summer 2023	Data Collection Team will collect condition/function-related and stressor data and include floristic quality and valley cross-section and valley slope data from 20 headwater slope wetland sites in 2022 and 20 headwater slope wetland sites in 2023. NMRAM data will be reviewed for quality assurance and then entered into SQUID. Floristic Quality data and valley cross-section and valley slope data (Rosgen 1996) will be entered into UNM Heritage databases for analysis/ validation of metrics.	Sawyer, Chauvin, Urbanovsky, Crosley, Nelson.

Task	Schedule	Description and Deliverable(s)	Responsible Parties
Multi-metric Analysis. Recalibration and Validation, Complete Manual and Field Guide	Ongoing through August 2023	**A)** NMRAM data will be analyzed and incorporated into rating curves for selected indices and sites scored. Indices and condition score will be recalibrated and validated to correlate landscape, abiotic, and biotic (attributes) and compare condition of sampling sites with levels of stress affecting the site. Results will be reviewed in a series of Assessment Team meetings and with the Advisory Team. **B)** Revise assessment protocol and incorporate modifications, including refinement of functional/condition indices, inclusion of any supplemental indicators, and modifications to condition scoring into Manual and Field Guide. Revise and refine definition of subclass based on data collection and revise datasheets as necessary. Review and update Stressor Checklists and develop a Risk Assessment based on the stressors that are affecting the site.	Muldavin, Milford, McGraw, Urbanovsky, Chauvin, Crosley, Sawyer, Nelson
Organize Assessment Protocol Short Course	August 2023	Present Manual and Headwater Slope Field Guide to agency, watershed group and contractor personnel in a three-day short course/field training for end-user's including data entry.	Muldavin, Milford, McGraw
Quarterly, Semi-Annual and final reports	Quarterly and Semi-Annually through December 2023	Quarterly reports of project progress from Contractor, Final Field Guide, Manual and fillable PDF data collection worksheets. Semi-Annual Reports to EPA and Final Report.	McGraw, Muldavin and Milford

A7 Quality Objectives and Criteria for Measurement Data

This section describes the data quality objectives of the project, identifies the targeted action limits and levels, and defines the measurement performance or acceptance criteria deemed necessary to meet those objectives.

The purpose of this project is to expand the knowledge of the condition of wetlands in headwater slope wetlands in New Mexico. Data quality will be measured against the quantitative and qualitative data quality indicators described below and in accordance with the Quality Objective and Criteria for Measurement Data Section of the SWQB QAPP (SWQB, 2018).

Table A7.1: Data Quality Indicators

Data Quality Indicator	Data Acquisition
Precision	Precision will be ensured by consistently assigning the same staff the responsibilities of collecting, recording and analyzing data.
Accuracy	Accuracy based on the use of methods determined to be reliable and tested through the pilot and subsequent field inventory components.
Bias	Bias will be reduced by using professional and experienced staff to collect and analyze data.
Representativeness	Sample Area selection is representative of the varied continuum of reference conditions needed to develop the methodology.
Comparability	Methods for data collection are standardized and reproducible from the development and adherence to this QAPP.
Completeness	All known sites within the subclass were selected to assess the range of conditions. All identified metrics will be collected for each of the Sample aAeas to ensure completeness.
Sensitivity	Sensitivity of the metrics used will be analyzed during the analysis and recalibrated as applicable to develop the methodology.

A8 Special Training Requirements/Certification

SWQB has qualified and experienced scientific staff, with expertise in GIS, wetland identification, Rosgen classification, groundwater monitoring, the development of rapid assessment methods, and southwestern riparian ecosystems to help carry out and administer this project. In addition, the Wetlands Program is using qualified contractors with extensive experience in New Mexico's wetlands and in the development of rapid assessments, biotic integrity, riparian vegetation and hydrogeology, geodatabase development, and field work to carry out this EPA-funded Rapid Assessment of Wetlands (Natural Heritage New Mexico), which will include a validation of spatial attributes applied to the assessment sites. The Assessment Team and Technical Advisory Committee for Rapid Assessment will be given a copy of this QAPP and will be instructed in appropriate validation and ground truth techniques.

Maryann McGraw (WPC), received her Bachelor's and Master's Degrees in Geology from University of Texas at Austin, and is an Environmental Scientist/Specialist Supervisor for SWQB. Maryann has been the principal investigator and contributing author for all NMRAMs to date. She has attended advanced training sessions in fluvial geomorphology assessment of stream

conditions and departures conducted by Dave Rosgen, California Rapid Assessment Method (CRAM), Hydrogeomorphic (HGM) training, National Wetlands Condition Assessment (NWCA) training and Stream Pyramid Training. The WPC has also conducted monitoring of riparian areas and assisted monitoring protocols for other wetlands projects during the last 15 years. She worked for NRCS Los Lunas Plant Materials Center propagating wetland plants. She was a member of the NWCA data collection Team in 2011, 2016 and 2021. She has also participated in the development of the Rio Puerco Monitoring Manual and is qualified for developing assessment criteria, conducting and participating in the training, and for overseeing and managing any of the monitoring procedures specified for this project.

Emile Sawyer serves as data collection technician for this project. He is an Environmental Scientist-Specialist and Wetlands Program team member for the SWQB, based in the Santa Fe Office. Prior to attending New Mexico Highlands University, where he earned his Environmental Science - Geology degree in 2003, Mr. Sawyer worked from 1992 to 2003 as a contract forestry technician throughout the Rocky Mountains. He earned his MS in Hydrogeology from the University of Nevada - Reno in 2009. Mr. Sawyer's graduate research at the Desert Research Institute in Reno, Nevada was based on using stable isotopes to track groundwater flow and evaluate a water balance model in the Colorado Flow System of eastern Nevada.

Davena Crosley serves as data collection technician for this project. She is an Environmental Scientist-Specialist Supervisor for the SWQB Watershed Protection Section, based in the Las Cruces Field Office. Ms. Crosley earned her Secondary Education and Science Education B.S. degree with an emphasis in Biology from Western New Mexico University in 1999, then went on to earn a MA in Science Teaching with an emphasis in Geology from Northern Arizona University in 2007, and an Interdisciplinary MA in Biology and Business from Western New Mexico University in 2011. Ms. Crosley researched vegetation recovery in post-fire treatment areas and utilization of these areas by avian species after the Whitewater-Baldy fire in the Gila National Forest in 2013. She also worked for the Mining Act Reclamation Program as a Reclamation Biologist reviewing, approving and ensuring suitable implementation of post-mining reclamation plans for hard rock mines in New Mexico.

Dustin Nelson, M.S. Environmental Science and Policy, serves as a data collection technician for this project. He is a Project officer for the effort and is responsible for data quality assurance and monitoring. He is an Environmental Scientist – Specialist and Restoration and Implementation team member for NMED, based in the Sante Fe Office. While attending San Francisco State University, he worked as a research technician, collecting data for and aiding in the implementing wetland restoration projects across the San Francisco Bay Area. After completing his B.S. in Biology in 2015, he worked as a crew lead for the vegetation crew at both Point Reyes National Seashore and Rocky Mountain National Park, treating invasive species and implementing restoration projects across a variety of habitats. He earned his M.S. at University of Wisconsin – Green Bay in 2020, focusing on the changes in plant and soil characteristics in a grassland restoration in degraded agricultural soils. Mr. Nelson has been trained in wetland ecology, plant identification, and wetland delineation, as well GIS systems, soils and water quality sampling.

Contractor qualifications are documented through resumes and professional references. The qualifications have been reviewed by the SWQB WPC for this project. The documentation of this information will be kept in the SWQB project files managed by the File Manager. NHNM staff resumes were submitted with the project proposal to EPA and are available from the project File Manager. Any changes to contractor personnel assigned to this project will only be

allowed with the provision of personnel qualifications and with the approval of WPC.

A9 Documentation and Records

Copies of this QAPP and any subsequent revisions will be provided to all individuals included on the distribution list by the SWQB WPC. Signed Acknowledgement Statements will be kept in the project file by the File Manager.

The WPC will also distribute all applicable protocol documents and subsequent revisions used throughout the project to the appropriate contractors. NHNM will prepare and submit quarterly project reports. These will be submitted to NMED, in accordance with the approved QAPP. The QAPP, protocol documents and reports will be maintained on the SWQB Wetland Program Coordinator's hard drive, SWQB server (File Depot) and in the project file at SWQB Santa Fe, at NHNM, and at the EPA Region 6 Wetlands Program.

This QAPP includes references to protocols for the development and testing of written procedures for all methods, metrics and procedures or protocols related to the collection, processing, analyses, reporting and tracking of environmental data. All data generated from this project and covered by this QAPP will be of sufficient quality to withstand challenges to their validity, accuracy and legibility. To meet this objective, data are recorded in standardized formats and in accordance with prescribed procedures.

The documentation of all environmental data collection activities will meet the following minimum requirements:

1. Data, data collection and analytical methods, and associated information must be documented directly, promptly, and legibly.
2. All reported data must be uniquely traceable to the raw data. All data reduction/transformation formulae must be documented.
3. All original data records include, as appropriate, a description of the data collected, units of measurement, unique sample identification (Request Identification [RID] number), station or location identification (if applicable), name and signature or initials of the person collecting the data, and date of collection.

Any changes to the original (raw data) entry must be clear and not obscure the original entry. Taxonomic refinements and translational typographic errors will be corrected on the field datasheets and in the database, with clear documentation of what and by whom those changes were made.

A9.1 Reporting Format and Storage

All field data will be recorded each day and for each metric on project-specific field data sheets. The field crew will scan a representative sample and email them to the SWQB WPC. After the field work, the NHNM Project Coordinator will assign NHNM personnel to enter the data into the NHNM database. Typically, this task is assigned to several personnel to reduce fatigue. Assigned staff may include the NHNM Project Coordinator, Data Technicians, interns, or contractors (e.g. botanist). The personnel entering data from a datasheet will sign and date each sheet when it is complete. The NHNM database requires a username, password, and specific permissions to access and edit data, and tracks the username and date when records are added or edited. Once the data have been entered and corrected, the Project Manager will assign NHNM staff to scan the field data sheets if not already electronically generated; these will be delivered to the SWQB WPC. The Surface Water Quality Information Database (SQUID) is the central repository for NMRAM data at SWQB. NHNM will deliver the data into a geodatabase that includes all related tables and metadata to the NMED for inclusion in SWQB project files until SQUID is prepared for headwater slope wetland NMRAM data entry. The SWQB WPC will ensure this data has been entered into SQUID by December 2023. Copies of the paper datasheets will be kept in the project file at SWQB and at NHNM office. A list of Sample Areas visited, and site scores will be provided by the WPC to EPA Region 6 Wetlands Program as a deliverable attachment to the semi-annual reports. The data collection report produced by the Contractors and SWQB will include scans of the data collection worksheets in an appendix.

B DATA GENERATION AND ACQUISITION

B1 Sampling Design

The selection of the headwater slope wetland subclass was based on SWQB prioritization of wetland types. The details regarding this prioritization are:

1. absence of data or assessment methods for headwater slope wetlands and
2. continuum of disturbance

The Upper Rio Grande, Rio Chama and Canadian Watersheds and Jemez Mountains were chosen as the Reference Domain based on:

1. existence of potential best available reference sites
2. access
3. relation to existing SWQB water chemistry data collection sites
4. potential for impairment by future stressors (anthropogenic activities)

All potential headwater slope wetland areas representative of the subclass will be initially identified within the Reference Domain using ArcGIS rev. 10.8 file geodatabase format or the latest version compatible with SWQB software. The individual sites representing the headwater slope wetland subclass will be selected by visually inspecting National Wetlands Inventory (NWI) map layers and other GIS-based collateral data layers by NHNM. Riverine waters with water quality stations located downslope of headwater slope wetlands will be identified using SWQB 305(b) waters GIS layers over a background of digital orthophoto quarter quad (DOQQ) layers

for the target Reference Domain. Polygons will be drawn over each headwater slope wetland complex segment within the Reference Domain (see Figure A6.1).

The polygons will be reviewed for accuracy and consistency and then broadly ranked by degree of disturbance. The reference set will be narrowed down to (50) that fit within the wetland subclasses in the Reference Domain. The July-August 2022 field data acquisition will be narrowed down to 20 selected sites for the NMRAM headwater slope wetlands subclass in the Reference Domain. An additional 20 sites will be selected for the Summer 2023 field season to test refined metrics and answer questions about headwater slope wetland condition. The sites will be selected based on available access, representation of the range of disturbance and to address subclass-specific issues.

Draft metrics will be selected by the Assessment Team for testing. Draft metrics will represent relevant attribute categories such as Landscape Context, Size, Biotic, and Abiotic (Table B1.1). The metrics are measured using maps and aerial imagery or evaluated in the field. Landscape Context and Size metrics are assessed using maps and/or a geographic information system (GIS) and these are termed "Level 1" metrics (Fennessy et al 2004). Landscape Context metrics usually are evaluating conditions surrounding the Sample Area (the Buffer, Riparian Corridor, or Land Use Zone) and are preferably completed before going into the field to help familiarize the team with the site. Size metrics are also measured using maps. Level 1 metrics are also confirmed or modified as necessary during the field survey.

Table B1.1. Major categories of indicators, sample indicators and assessment level of effort used in wetland rapid assessment methods.

ATTRIBUTE	**INDICATOR**	**LEVEL**
Hydrology (Abiotic)	Hydrologic Alterations	2
	Hydroperiod	1
	Surface Water Connectivity	2
	Flood Storage Potential	2
	Water Sources	2
	Maximum water depth	2
Soils/Substrate (Abiotic)	Substrate Disturbance	2
	Microtopography	2
	Sediment Composition	2
Vegetation (Biotic)	Degree of Interspersion	1
	Extent of Invasive Species	2

	Endangered/threatened species	1 and 2
	Presence and cover of wetland plant species	2
	Vegetation Vertical Structure	2
	Course Woody Debris	2
	Dominant Vegetation	2
	Native Riparian Tree and Shrub Regeneration	2
	Relative Native Plant Community Composition	2
Landscape Context and Size	Size	1
	Relative Wetland Size	1
	Surrounding Land Use	1
	Riparian Corridor Connectivity	1
	Extent and Condition of Buffer Zone	1
	Wetland Configuration	1

In contrast, Biotic and Abiotic metrics are determined and evaluated in the field. rapid field-based metrics are termed “Level 2” metrics. Biotic metrics may be based on floristic or wildlife data that represent habitat condition. Abiotic metrics may be based on hydrology, geomorphology, physical features, or soil conditions. Level 2 metrics are sensitive to disturbance and can be collected by using data collection methods or observations with direct results in the field or by matching features within the Sample Area with narrative descriptions identified in past NMRAM’s.

Rapid assessments do not use methods that require lab analyses or other intensive methods which would be considered Level 3. However, during the initial phase of data collection (Summer 2022), level 3 methods will be employed to validate chosen rapid assessment metric use. These include vegetation floristic quality (see Reference Section for methods), ground water piezometer water level, water pressure and temperature data using data loggers (Technical Notes ERDC TN-WRAP-00-02 *Installing Monitoring Wells/Piezometers in Wetlands* and ERDC TN-WRAP-05-2 *Technical Standard/or Water-Table Monitoring of Potential Wetland Sites*) and valley cross-section and valley slope measurements following Rosgen Level 2 (Rosgen 1996) techniques.

In addition, a draft set of field-based stressor checklists grouped by attribute class for evaluating potential drivers of ecological condition at local to watershed scales are completed during the field survey along with annotated field maps and documentary photographs. During the initial data collection, the Field Teams take additional notes and photographs to provide feedback to the Assessment Team as to how the draft metrics are applied, details for describing the

application of the metrics, stressors that are evident, and other comments that will help in the refinement of a suite of metrics and assessment protocols that evaluate wetland condition.

After data from the 2022 data collection effort is analyzed and refined for further testing, a second 20 sites will be selected for 2023 field season data collection to further test and finalize metrics.

The NMRAM Field Guide for Headwater Slope Wetlands will provide procedures for conducting the rapid ecological assessment. It will provide specific protocols and datasheets for evaluating wetland ecological condition using a combination of GIS-based measurements and field surveys. In addition to details on metric measurements, appendices are provided that include at minimum, the data collection worksheets, a plant species list with wetland indicator status, an invasive plant species list and a glossary of terms.

In addition, identified stressors will be evaluated and documented on the stressor checklist during the field survey. Maps will be annotated with data collection site details, changes to landscape and size metrics and other features of note in the Sample Area and the surrounding buffer. Documentary photographs allow the Field Team to relate findings back to the Assessment Team as well as supporting choices and data collected in the field. Documentary photographs are also taken of plant species that need further identification and as supporting documentation for plant communities identified in the Sample Area. Photographs are used as supporting data collection and are generally not considered a metric or used as data by themselves.

Metric scores based on Level I analysis and field data (Level 2) are weighted by importance and rolled up into an attribute score (i.e., Size, Landscape Context, Biotic and Abiotic Scores) where A = Excellent (≥3.25-4.0); B = Good (≥2.5-<3.25); C = Fair (≥1.75-<2.5), and D = Poor (1.0 -<1.75). The rationale behind scoring procedures and the efficacy of any given metric will be provided in the NMRAM Manual.

A set of worksheets organized by attribute classes will be developed to support efficient data capture**.** These data collection worksheets will be provided as printable forms in Appendix A of the Field Guide and as a downloadable fillable PDF file that computes and rates most metrics automatically and rolls up the scores for the user. The worksheet packet contains a cover worksheet for recording basic information, surveyor identification, and narrative descriptions of the Sample Area by attribute. The worksheets together with maps and photographs make up the NMRAM Assessment Package that becomes the supporting record at a project level and the tool for data entry into SQUID. A Team Leader will check field sheets for accuracy and completeness prior to leaving the Sample Area. A representative set of field sheets will be scanned and sent to the WPC and/or NHNM Program Manager for further inspection and review.

B2 Sampling Methods

The draft metrics will be designed to measure aspects of condition that are relative to the reference conditions based on the literature cited in the Reference section of this QAPP and on best professional judgment. Potential metrics are not limited to those in the literature but are provided as an example of the types of data to be assessed.

B2.1 Surface Water Sampling at Headwater Slope Wetland sites

No surface water samples will be taken for the NMRAM for headwater slope wetlands.

B2.2 Field Health and Safety Procedures

The NHNM/SWQB data collection team will conduct field trips to complete assessment work. These will be scheduled during late summer during the index period for most plants that might be encountered in the field. Field data collection will be scheduled to avoid thunderstorm activity and flooding in headwater slope wetlands, and in warmer weather while plants are more likely to be in bloom for purposes of identification.

Safety is of primary importance to field studies. Only sites that are safely accessible will be sampled. Unsafe sites include, but are not limited to, private lands not granting permission access, areas with evidence of illegal activities, exceptionally remote canyon settings.

In remote areas, the data collection team will always carry sufficient supplies of water, food, flashlights, shovels, extra spare tires, and first aid and emergency supplies to deal with accidents and unexpected circumstances, such as rapid changes in weather. Hard hats and closed-toe boots are required in burned or construction areas. Teams will have adequate communication devices for their location (cell phones, gps, etc.). A field team will consist of at minimum a botanist, a hydrogeologist, and technical assistants. A designated crew leader will be determined by NHNM Project Coordinator and WPC during the Field Team training before data collection field trips, and will be responsible for field trip decisions, crew performance, and data compilation. At least one team member will have swift water training. All team members will be up to date on Covid-19 related safety practices and adhere to any requirements that prevents the spread of Covid- 19 virus.

Any invasive species will be identified during data collection at the 40 wetland sites. Measures will be taken to prevent the carrying of seeds and propagules from site to site including the visual inspection and sterilization of shoes, clothes and equipment. Measures and procedures for invasive species control will also be included in the NMRAM Field Guide for Headwater Slope Wetlands.

B2.3 Field Variances

As field conditions vary there may be the need for safety, common sense, or local site variables that prohibit or require minor adjustments to the sampling procedures and protocols. Such changes will be reported to the crew leader and that information passed on to the QAO. If there is a deviation from the QAPP, the project manager/project coordinator must notify the QAO and provide written notification of the proposed changes and explanation on the reasoning behind the change. Upon the QAO's approval, modification to the QAPP will be sent to the EPA for review and approval. Sampling problems, minor adjustments of field sampling, and QAPP modifications will be documented in any semi-annual reports to US EPA.

B2.4 Decontamination Procedures

Field equipment and shoes will be decontaminated between sites using a dilute bleach solution. This decontamination procedure is needed to prevent the spread of aquatic and terrestrial

invasive species. Field clothing, including boots, will be decontaminated using a dilute bleach solution either in the field or by frequent laundry machine application. Disposal of decontamination fluids and rinse fluids is described below under "Disposal of Residual Materials". Any gloves used during the sampling regime will be considered disposable and will be packaged for disposal appropriately between sites.

B2.5 Disposal of Residual Materials

In the process of sampling there may be a small amount of waste, including used personal protective equipment (PPE). The USEPA's National Contingency Plan requires that management of the wastes generated during sampling comply with all applicable or relevant and appropriate requirements to the extent practicable. Residuals generated for this project will be handled in a manner consistent with the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (May 1991), which provides the guidance for the management of wastes. In addition, other legal and practical considerations that may affect the handling of the wastes will be considered, as follows:

Used PPE and disposable containers or equipment will be bagged and placed in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any used PPE and disposable containers or equipment (even if it appears to be reusable) will be rendered inoperable before disposal in the refuse dumpster.

Decontamination fluids generated in the sampling event could consist of water and bleach. Decontamination fluids will be disposed into a municipal sewerage or onto an impervious surface for evaporation, at least 50 m from the nearest surface water.

B3 Sample Handling and Custody

No samples are expected to be collected for analysis at a laboratory for this project.

B4 Field Measurement Methods

Relevant metrics using Rosgen Level 2 geomorphology survey techniques, such as cross-sections and longitudinal profiles, will be conducted at the 40 selected wetland sites throughout the Reference Domain as needed. Methodology will follow that developed by Rosgen (1996) Applied River Morphology. Surveys will be GPS-located for future data collection efforts to ensure repeat survey data collection are recreated accurately.

Plant communities will be documented using photographs throughout the Sample Areas. Photograph site locations will be recorded using a GPS to ensure accurate creation of the plant community map. Special features of headwater slope wetlands such as fens will also be documented with photos and GPS locations. Photo documentation will occur during July-August 2022 and Summer 2023 data collection. Other documentary photographs include cross-section locations laterally across the valley floor and up-valley and down-valley from the cross-section locations. Photograph documentation details will be recorded on the data collection worksheets on designated photo-documentation pages.

Locations for the installation of piezometers will be recorded using GPS measurements. Measuring groundwater levels will be conducted in accordance with the Wetlands Regulatory Assistance Program's Technical Notes ERDC TN-WRAP-00-02 *Installing Monitoring Wells/Piezometers in Wetlands* and ERDC TN-WRAP-05-2 *Technical Standard/or Water-Table Monitoring of Potential Wetland Sites.* A Level TROLL 500 Data Logger will be installed in each piezometer for continuously logging measurements of water level, water pressure and temperature. The data logger is available in vented (gauged) pressure ranges up to 500 psig for automatic atmospheric compensation. Sensors calibrated across the full pressure and temperature range deliver accurate data. This versatile, sub-1-inch instrument with accessories and in-well telemetry is easily integrated with VuLink and HydroVu Data Services to enable remote data access and automatic event alerts. Smart Addressing on all In-Situ equipment ensures that each parameter is always mapped to the same Modbus address, allowing you to connect any device to the same data logger without having to reprogram when logging the same parameter. The purpose of this is to help wetland scientists obtain quantitative information about shallow ground-water regimes near wetland boundaries and in adjacent uplands. Monitoring wells and piezometers are some of the easiest means of determining depth and movement of water tables within and immediately below the soil profile. Monitoring wells or piezometers will only be installed after landowner or Forest Service approval and any clearance/permits needed from Office of the State Engineer.

B5 Quality Control

Quality control (QC) activities are technical activities performed on a routine basis to quantify the variability that is inherent to any environmental data measurement activity. The purpose for conducting QC is to understand and incorporate the effects the variability may have in the decision-making process. Additionally, the results obtained from the QC analysis, or data quality assessment, may identify areas where variability can be reduced or eliminated in future data collection efforts, thereby improving the overall quality of the project being implemented. Many of the proposed metrics consist of observation data including plant species lists and site geomorphology. To ensure quality control for these observational data, the data collection team will have subject matter experts. For example, the team will include a trained or degreed botanist, a hydrogeologist to eliminate errors.

B5.1 Field Sampling Quality Control

All Data Collection Team members who collect environmental data must be trained in the use of the metric protocols and will collect data in accordance with the procedures as they are defined in the draft NMRAM Field Sheets and at the training session.

Several potential metrics lend themselves to observer bias, particularly estimation and measurement of vegetation cover and land use cover. Density estimation sheets are useful for training and calibration of field team members and will be part of the NMRAM Field Guide if other sources are not available. Results of all Data Collection Team training prior to field data collection and calibration efforts will be documented and provided by NHNM in quarterly reports to SWQB.

B5.2 Data Entry Quality Control

Field sheets will be organized, reviewed for completeness and placed in a labeled file folder by the team leader. The fillable PDF data collection worksheets flags entries or values that are not consistent with that expected for the metric. NHNM trained support staff will enter the data

into NHNM database other than the individual who filled out the field sheet. Should any questions arise, the data entry personnel will add a note to the field sheet and contact the field team member to answer that question. When each data point from a page has been addressed, the data entry staff person will sign and date the field sheet. The NHNM Program Manager and the WPC will review all data, using standardized exported reports that identify missing values and outliers.

B6 Instrument/Equipment Testing, Inspection, and Maintenance

The NHNM Team Coordinator is responsible for inspecting equipment and supplies before leaving for field data collection field trips and upon return to NHNM office.

The equipment used to collect physical measurements include a survey device (e.g. laser level, auto level, theodolite, or total station depending on the contractor), global positioning system unit (GPS), camera, and, if time and funding are available, soil moisture probes. For groundwater monitoring, up to ten piezometers will be installed at headwater slope wetland sites advantageous to supporting groundwater metric development. In Situ Level Troll 500, 0-15psig level trandsducer/logger (guage pressure), ABS will be installed at each piezometer site.

All field 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.

Maintenance logs are maintained for all SWQB instruments and equipment. Consultants will use their own equipment. Results of equipment inspections will be noted in the maintenance log and/or project file. Any deficiencies in equipment will be noted and reported immediately. If condition of equipment is in doubt, it will not be used. In the event of instrument failure the NHNM Team Leader or the SWQB Technical Team Member will correct the problem, rejecting the resultant data or accepting the data with notations.

B7 Instrument/Equipment Calibration and Frequency

Rosgen Level 2 measurements will employ laser level or total station equipment for conducting cross-section and longitudinal profile data at each headwater slope wetland Sample Area in order to develop some abiotic and biotic metrics. The resulting rapid assessment metrics will be limited to those that can be collected using a tape measure and level. Data loggers installed at piezometers will be calibrated in the field prior to installation.

B8 Inspection and Acceptance of Supplies and Consumables

B8.1 Field Sampling Supplies and Consumables

The NHNM Team Coordinator is responsible for preparing equipment and supplies checklists and informing the Data Collection Team leader of needed supplies and equipment for each field sampling trip. Contractor field sampling supplies and consumables are checked at the end of every field trip by the Data Collection Team Leaders. Replacement supplies and consumables are purchased as needed and checked before the next field trip. All team members are expected to be familiar with the equipment and supplies needed for an individual trip. A copy of the checklist is reviewed and completed during trip planning.

B9 Non-Direct Measurements

Printed field maps for each data collection site are an integral part of the NMRAM Assessment Package. Printed field maps will be prepared for each data collection site by the NHNM Team Coordinator. Two different map formats are required to support field mapping and the field survey; 1) A Landscape Map at approximately 1:4,000-6,000 scale that shows the Sample Areas in a landscape context. This map should delineate the maximum extent of a potential buffer and land use index area. 2) a SA Map that encompasses a single Sample Area at between 1:1,000-2,500 scale for mapping vegetation communities, abiotic features and transect locations. Two copies of the SA maps are required, one for measuring biotic metrics and one for measuring abiotic metrics. Modifications to the Sample Area boundary will be recorded on both the SA Biotic and Abiotic maps.

B10 Data Management

Data obtained for this project are maintained in a relational database and GIS electronic files at NHNM and SWQB. All electronic data will be filed and labeled in a consistent manner. All data will be delivered to the WPC as soon as practical following data collection event. All data are secured through password protection and are unavailable to unauthorized users, to protect from accidental manipulation. Exported geodatabases that are delivered to the SWQB contain metadata that includes the date of export. Data transmitted to the SWQB and advisory committee are available at NHNM, on the SWQB hard drive, SWQB server (File Depot) and in hard copy form as Wetlands Program files that are maintained by the SWQB File Manager.

Contractors will provide summary reports to the SWQB WPC. All data and summary reports will be compiled into the semi-annual and final project report and provided to US EPA Region 6 Wetlands Program.

B10.1 Data Acquisition, Direct Measurements

Expeditious data entry helps ensure field team memory of site-specific details, and ability to respond to questions by the project and program managers about questionable data.

NHNM follows three data acquisition principles:

1. It should be highly efficient, requiring no more time to enter the data than it did to collect them.
2. The data entered should be restricted to assure accuracy and consistency, with terminology, scientific names, and responses limited to values in lookup tables, yet have the flexibility to allow for anomalous occurrences.
3. Users must be able to easily export meaningful data.

C ASSESSMENT AND OVERSIGHT

C1 Assessment/Oversight and Response Actions

The SWQB WPC provides project oversight by reviewing data collection efforts. The NHNM Data Collection Team leader provides day-to-day oversight during data collection activities including adherence to this QAPP. Any problems encountered during the course of this project will be immediately reported to the SWQB WPC, who will consult with appropriate individuals to determine appropriate action. Should the corrective action impact the project or data quality, the SWQB WPC will alert the QAO. If it is discovered that NMRAM methodologies must deviate

from the approved QAPP, a revised QAPP must be approved before work can be continued. All problems will be documented for inclusion in the project file, semi-annual and final reports. The SWQB WPC will assess project progress to ensure the QAPP is being implemented, including periodic audits by the QAO, as needed. Those assessments and any problems will be reported by the SWQB WPC to the QAO.

C2 Reports to Management

Quarterly reports will be prepared and reviewed internally by the Contractor and presented to the SWQB WPC and staff their review. Any deviations from the specifications in the SWQB Project Workplan and NHNM Memorandum of Agreement for this project will be documented and reported to WPC. Following inclusion of SWQB review comments, the Contractor will submit finalized reports to the SWQB WPC, who will present those reports to the US EPA Grants Project Officer, to show project accomplishments, data acquisition and entry, and to provide a venue to bring up any issues with the project. The reports will allow the EPA to assess the productivity of the NMRAM for headwater slope wetlands and be kept informed on the progress of the project. A report detailing the findings will be provided in the final project report to EPA by SWQB. The Field Guide and Manual will serve as major documentation of the NMRAM for headwater slope wetlands, and will relate the findings to several different NMRAMs, covering different wetlands types in New Mexico.

D Data Review and Usability

D1 Data Review, Verification, and Validation Requirements

Prior to using the data for wetlands protection, policy, or public uses, the quality of the data will be reviewed and evaluated, as described in Sections B10.1 and C1, above. Data are compiled from field sheets, reviewed and verified by NHNM staff that did not enter those data, and re-verified and validated by NHNM Project Coordinator. Errors will be corrected where possible and rejected and reported upon by the NHNM if questions about those data cannot be satisfactorily answered. Additional review, verification, and validation will be completed by SWQB WPC. Standardized and randomized checks of data entry, field calibration of instrumentation, and technician training will be conducted and reported upon by the NHNM, and data error levels above 1% will not be accepted. These data review, verification, and validation efforts will ensure NHNM provides high quality assessment data to SWQB.

D2 Verification and Validation Methods

Defining the data verification and validation methods helps ensure that project data are evaluated in an objective and consistent manner. For the current project, such methods have been described in Section D1 (above) for information gathered and documented as part of the field measurement activities.

D3 Reconciliation with User Requirements

NHNM, in collaboration with the SWQB and the Technical Advisory Committee, will use the assembled pilot study data to clarify issues related to protocol adequacy, completeness, and efficiency. The data assembled through the larger inventory and assessment will be used to further those analyses, and to address the question of the applicability of the methods to demonstrate the utility of the NMRAM for headwater slope wetlands in New Mexico. Critical analyses here will include the adequacy of the methods for identifying individual sites that are

exemplary and of use as reference sites, sites at which management attention is warranted, and sites at high levels of risk due to anthropogenic impacts. Such analyses will be conducted using ranked, non-parametric statistical analyses, and multivariate analyses of the diverse physical, and biological ranking. These analyses will help clarify the utility of the project to meet the management and policy needs of the State of New Mexico.

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Appendix 1: Acknowledgement Statement

New Mexico Environment Department Surface Water Quality

New Mexico Rapid Assessment Method for Headwater Slope Wetlands and USACE NMRAM Phase 3

Quality Assurance Project Plan Acknowledgement Statement (QAPP)

This is to acknowledge that I have received a copy of the QAPP for New Mexico Rapid Assessment Method for Headwater Slope Wetlands and USACE NMRAM Phase 3.

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 Wetlands Program Coordinator (Maryann McGraw)