NTESS Exhibit 1

John Kay, P.G.

National Technology & Engineering Solutions of Sandia, LLC

Sandia National Laboratories, New Mexico

Areas of Specialization

Hydrologic investigations, National Pollutant Discharge Elimination System (NPDES) compliance, water quality monitoring and characterization, project/program management, environmental regulatory compliance.

Academic Degrees

M.S., Hydrology, University of Arizona, 2000

B.S., Geology, Northern Arizona University, 1997

Professional Registrations

Professional Geologist, State of California, No. 8821

Certified Professional in Erosion and Sediment Control, No. 8358

Employment History

Sandia National Laboratories, Albuquerque, New Mexico, 2015 to present
Engineering Project/Program Lead

Daniel B. Stephens & Associates, Inc., Albuquerque, New Mexico, 2001 to 2015
Senior Hydrologist/Project Manager

University of Arizona, Tucson, Arizona, 1999 to 2000
Research Assistant, Department of Hydrology and Water Resources

Tucson Water Department, 1998
Intern, Research & Technical Support Division

Northern Arizona University, Flagstaff, Arizona, 1996-1997
Field/Laboratory Technician, Geology Department

Professional Experience at Sandia National Laboratories

- ***Program Lead, Stormwater Quality Program.*** Since December 2018, oversee NPDES permit compliance activities for stormwater quality at Sandia National Laboratories (SNL) facilities in NM, NV, TX, and HI. Supervise and coordinate the work of staff members and field technicians. The stormwater program administers and complies with three NPDES permits; the Construction General Permit (CGP), Multi-Sector General Permit (MSGP), and the Municipal Separate Storm Sewer System Permit (MS4). There are typically 40 separate permitted facilities at any one given time. Developed corporate policy, requirements, and training to protect stormwater quality at SNL.
- ***Program Lead, Environmental Facilities Support Program.*** Since September 2024, oversee a team of compliance specialists who ensure environmental compliance at construction and maintenance projects. Work includes engaging with work planners, project managers, construction contractors, and environmental subject matter experts to ensure that environmental requirements are identified, communicated, and implemented over the entire project life cycle.

- ***Technical Support, Environmental Restoration Group.*** Provide groundwater assistance to the Environmental Restoration group as needed to help them manage fluctuations in workload. Developed well abandonment plan. Oversaw multiple well abandonment and installations during 2022. Assisted with development of H&S Plan and other technical work documents for the TA-V Bioremediation Project and supported the project with field work and oversight/escorting of contractors. Assisted with the work plan for the Burn Site Pumping Test, provide hydrologist field support during the Burn Site pumping test, reviewed presentations and posters for public meetings. Provided peer review of the Annual Groundwater Monitoring Reports and other various documents/deliverables.
- ***Acting Lead, Environmental Restoration Field Office.*** Oversaw daily work of the Environmental Compliance and Monitoring field crew. Scheduled work and staffing resources. Conducted training of new staff. Acted as Sandia Delegated Representative for service contracts. Purchased field equipment and supplies as needed. Participated in interviews and hiring of new staff members.
- ***Acting Work Planner.*** Oversaw work planning and controls for the Environmental Compliance and Monitoring Department. Conducted annual team safety review meetings, assist program leads with hazard assessments and mitigations, track training requirements, review Field Operating Procedures and Administrative Operating Procedures for proper ES&H requirements. Work with training coordinator to ensure staff have received required training based on the Authorized User's Lists they have signed. Retain work planning and controls records.
- ***MS4 Permit Lead.*** Obtained coverage for SNL/NM under the Municipal Separate Storm Sewer System (MS4) Permit. Developed the MS4 Stormwater Management Program Plan for SNL/NM. Developed programmatic and technical work documents to support work, including AOP, FOP, PHS field forms. Trained Field Team to conduct sampling in accordance with the permit. Administered the SWMPP and maintained SNL/NM compliance with the Permit since 2015. Provided a wide range of support to the stormwater program, as well as surface discharge program, wastewater program, oils storage program, and environmental release reporting program.

Other Representative Professional Experience

- ***Senior Scientist/Project Manager, Daniel B. Stephens & Associates.*** Managed environmental characterization and remediation projects. Typical projects included multi-disciplinary teams comprised of staff located in different offices, as well as sub-contractors. Prepared work plans and proposals, prepared requests for bids, developed project budgets and schedules. Developed project specific Health and Safety Plans. Managed client accounts, interfaced with regulators, and presented at public meetings and hearings.
- ***Health and Safety Officer, Daniel B. Stephens & Associates.*** Acted as interim and backup corporate H&S Safety Officer over 10-year span. Duties included review and approval of project health and safety plans, ensuring employees received required and appropriate training, conducting safety inspection of vehicles and equipment, maintaining safety equipment, and conducting internal training and pre-work safety briefings.
- ***Stormwater Discharge Permitting, Albuquerque, New Mexico.*** Project Manager. Assisted the Albuquerque Metro Area Flood Control Authority, University of New Mexico, the City of Albuquerque, and the NM Department of Transportation review new draft EPA Phase 1 MS4 discharge permits. Identified new requirements for storm water quality monitoring, sampling and analysis protocol, and reporting methods. Developed sampling and analysis plans, field sampling plans, and Quality Assurance Project Plans to help clients prepare for the issuance of the new permits in September 2014.

John Kay, P.G.

National Technology & Engineering Solutions of Sandia, LLC

Sandia National Laboratories, New Mexico

- ***Hydrogeologic Monitoring for Regulatory Compliance, Pepperdine University, California:*** Project Manager. Conduct hydrologic monitoring and reporting in support of Water Recycling Requirements, Waste Discharge Requirements, and NPDES discharge permit. Project includes regular monitoring of rainfall, irrigation, reservoir storage, surface water runoff, soil moisture, and groundwater elevations. Developed water balance model to track impact of reclaimed irrigation use on local groundwater conditions. Prepare annual reports to state and local regulatory agencies (Regional Water Quality Control Board, Los Angeles Department of Public Works) and local community groups.
- ***Data Management Plan, Elephant Butte Irrigation District, New Mexico:*** Project Manager. Conducted a review of EBID's surface and groundwater monitoring program and prepared a data management plan to help EBID ensure that data is collected with as much legal and technical integrity as possible. The plan includes QA/QC measures and standard operating procedures for all aspects of data generation and management from the calibration and installation of monitoring equipment to the report generation and data hosting on the EBID's website.
- ***Groundwater Resources Assessment, City of Las Vegas, New Mexico.*** Project Manager. Assisted the City of Las Vegas, New Mexico with the assessment and development of their groundwater resources. The goal of the work was determining the sustainability of groundwater resources in the city's Taylor Wellfield, and developing a long-term groundwater development strategy. Work included literature and field investigations of the local hydrogeology, conducting aquifer tests, groundwater modeling, and use of isotopes for identifying the source and age of groundwater. This work also included the installation of new wells, evaluation of brackish water resources, and the potential for implementing aquifer storage and recovery with surface water from the Gallinas River.
- ***Permit Application and Design for Facility Expansion, Southwest Landfill, Albuquerque, New Mexico:*** Project manager for the preparation and submittal of a permit renewal and modification for the 120-acre construction and demolition Southwest Landfill. The permit application included both lateral and vertical expansions, as well as a 20-year extension of permit period. Oversaw and guided all aspects of the permit preparation, to ensure compliance with the Solid Waste Act, New Mexico Solid Waste Regulations, and conditions imposed by the New Mexico Environment Department. Presented expert testimony at public meeting and permit hearing.
- ***Performance Monitoring of Evapotranspiration (ET) Cover Landfills, various clients, Western United States:*** Designed, installed, and maintained long term monitoring systems to directly measure and quantify movement of soil moisture within ET cover landfills in support of regulatory permit applications. Conducted laboratory studies on the effectiveness of different capillary barrier systems to reduce downward migration of atmospheric water through ET covers.
- ***Master's Thesis, Uptake of Trace Metals onto Manganese Oxides, Globe, Arizona:*** conducted field and laboratory experiments to improve understanding the mechanisms for how divalent metals (Cu, Co, Zn, Ni, Mn) are incorporated into Mn-oxide minerals that coat sediment in the stream channel of Pinal Creek, AZ, due to contamination form nearby copper mining activities. The research was part of a larger effort to determine the best methods and environmental risks associated with several remediation methods being evaluated.

Professional Affiliations

National Ground Water Association

National Water Resources Association

John T. Kay, P.G.

National Technology & Engineering Solutions of Sandia, LLC

Sandia National Laboratories, New Mexico

Publications and Presentations

Stephens, D.B., J. Cherney, J. Kay, T. Umstot, P. Kaiser, and B. Casadevall. 2013. Unexpectedly rapid migration of perchlorate through a thick vadose zone under low rainfall conditions. Invited speaker at the National Ground Water Association Pillars of Groundwater Innovation Conference. November 7-8, Phoenix, Arizona.

Isaacson, K., G. Peterson, J. Kay, and J. Kelsey. 2012. *Case studies of performance monitoring of infiltration BMPs.* Presented at StormCon 2012, Denver, Colorado, August 23, 2012.

Mahan, Shannon, and Kay, John, 2012, *Building on previous OSL dating techniques for Gypsum: A case study from Salt Basin Playa, New Mexico and Texas:* Quaternary Geochronology, 10, p. 345-352. doi: 10.1016/j.quageo.2012.02.001

Isaacson, K., J. Kelsey, and J. Kay. 2011. *Comparison of methods of monitoring infiltration.* Presented by Kelly Isaacson on behalf of DBS&A at 2011 American Water Resources Association Annual Water Resources Conference, Albuquerque, New Mexico, November 10, 2011.

Golden, T, E. Pease, G. Peterson, and J. Kelsey. 2011. *Thermally enhanced remediation.* Presented by Thomas Golden on behalf of DBS&A at 2011 American Water Resources Association Annual Water Resources Conference, Albuquerque, New Mexico, November 7, 2011.

Kay, J., S. Moore, J. Kelsey, 2010. Low Impact Development Measures for the Protection of Groundwater. 1st Annual Green Infrastructure/LID Conference, Las Cruces, NM.

Kay, J., J. Kelsey, J. Narvaez, R. Mears. 2007. Data Acquisition and Management for Accurate and Defensible Water Resources Accounting. 20th Annual Arizona Hydrological Society Symposium,. Tucson, Arizona. August 29-September 1, 2007

Moore, S., J. Kay, J. Kelsey, J. Stomp. 2007. Vadose Zone Characterization for the Bear Canyon Recharge Demonstration Project, Albuquerque, New Mexico. Presented at the 2007 National Groundwater Association Groundwater Summit, Albuquerque, New Mexico. April 29-May 3, 2007.

Kay, J.T. 2006. Increasing Water Demands Drive Innovative Water Management. *New Mexico Business Journal*, 30 (9), pages 10-11.

Kelsey, J.A., J.T. Kay, M.D. Ankeny, and M.A. Plummer. 2006. Darcian Flux Estimations in Evapotranspiration Landfill Covers. The Fourth International Conference on Unsaturated Soils, Paper No.12545. Carefree, Arizona. April 2-6, 2006.

Kay, J., J. Kelsey, A. Ewing, E. Pease. 2005 Estimating Moisture Flux in the Vadose Zone. 2005 New Mexico Technical Water Research Symposium, Socorro, New Mexico. August 2005.

Kelsey, J.A. and J.T. Kay. 2003. Infiltration Using Self-Cleaning Siphon System. Presented at the 2003 Annual American Water Resources Association Conference, San Diego, California. November 2-5, 2003.

Kay, J.T., M.H. Conklin, C.C. Fuller, and P.A. O'Day. 2001. Processes of nickel and cobalt uptake by a manganese oxide forming sediment in Pinal Creek, Globe Mining District, Arizona. *Env. Sci. Tech.,* 35 (24), pages 4719-4725.

NTESS Exhibit 2

STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED PETITION TO AMEND 20.6.4.97 NMAC TO MODIFY DESIGNATED USE OF THE RIO GRANDE TO FOUR HILLS BRIDGE REACH OF THE TIJERAS ARROYO

No. WQCC 25-28

National Technology & Engineering Solutions of Sandia, LLC,

Petitioner,

DIRECT TECHNICAL TESTIMONY OF JOHN KAY

My name is John Kay, and I work at National Technology & Engineering Solutions of Sandia, LLC (NTESS), as the Program Lead for stormwater permitting and compliance. NTESS is the operator of Sandia National Laboratories, New Mexico (SNL/NM) under contract to the Department of Energy (DOE), National Nuclear Security Administration (NNSA). I have been in this position for over 10 years. My primary job responsibilities include ensuring compliance with National Pollutant Discharge Elimination System (NPDES) stormwater permits, and implementing corporate policy related to the protection of stormwater quality.

I have a Bachelor's degree in Geology from Northern Arizona University, and a Master's degree in Hydrology from the University of Arizona. Prior to my current position, I worked as a senior hydrogeologist at Daniel B. Stephens & Associates, Inc., where I was responsible for groundwater investigations, environmental monitoring, stormwater quality, and project management. My resume is attached as NTESS Exhibit 1.

Between 2018 and 2023 NTESS conducted a Use Attainability Analysis ("UAA") for the Rio Grande to Four Hills Reach of Tijeras Arroyo (AU NM-9000.A_070). The purpose of conducting the UAA was to formally evaluate whether the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo exhibits characteristics of an ephemeral water body under 20.6.4.97 NMAC. Based on the information presented in the UAA, the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) does exhibit the characteristics of an ephemeral water body. I will discuss the details of the UAA below.

In accordance with 20.6.4.15(A) NMAC and 40 CFR 131.10(g), a UAA is required any time the criteria for a proposed designated use are less stringent than the criteria for the current designated use for a surface water of the state. A UAA is a scientific study used to determine the factors affecting attainment of a designated use. There are three primary elements to a UAA. First, the proposed change in the designated use must be determined to have equal or more stringent criteria than the existing use. An existing use is defined under 20.6.4.7(E)(4) NMAC as those uses actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use. The designated use, whether current or proposed, shall not be less stringent than the existing use. Second, pending the findings from evaluating the existing use, a UAA must then demonstrate that a designated use is not attainable due to one of the factors identified under 40 CFR 131.10(g). Third, once it has been demonstrated that the designated use is not attainable, the highest attainable use must be determined. Defining the highest attainable use requires evaluation of existing uses, biotic and abiotic conditions, anthropogenic influences, and consideration of protected status delegations.

A UAA must demonstrate that attainment of a designated use is not feasible based on at least one of the factors identified in 40 CFR 131.10(g). The primary focus of the UAA for Tijeras Arroyo was factor (2): natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met.

The Tijeras Arroyo is located in the Tijeras Arroyo Watershed, which is identified by a 10-digit hydrologic unit code (HUC). The study area for the UAA includes the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) and adjacent portions of the Tijeras Arroyo Watershed having the potential to impact flows within the reach. The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo is currently classified as an intermittent stream with designated uses of marginal warmwater aquatic life, primary human contact, livestock watering, and wildlife habitat. The difference in designated uses between intermittent and ephemeral waters are the aquatic life and human contact uses. Therefore, the UAA evaluates the aquatic life and human contact designated uses of the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo.
The only sources of flow in the reach are direct stormwater runoff from localized storm events and small, irregular non-stormwater discharges from municipal activities. Non-stormwater discharges occur sporadically during the year and for short durations. They are typically small and infiltrate quickly within the stream channel, rarely generating flow within the reach. It is exceedingly rare that non-stormwater discharges would be able to reach the Rio Grande. There are no other known permitted or unpermitted discharges to the reach (NPDES or otherwise).

There were no fish, macroinvertebrates, algae, hydric soils, seeps, springs, or iron-oxidizing bacteria found anywhere in the reach. Geomorphic characteristics of the reach—including channel structure, substrate sorting, floodplain dimensions, and sinuosity—were all indicative of ephemeral characteristics. Vegetation within and adjacent to the reach is similar in composition to upland vegetation outside the active floodplain. No riparian zones were encountered. The vegetation was characteristic of ephemeral conditions. Hydrology protocol scores for individual

sub-reaches ranged from 4.0 to 8.0. The average score for the entire reach was 6.1. The Hydrology Protocol guidelines suggest that a score of 9 or less is an indication of ephemeral conditions.

The hydrogeologic and stream flow conditions described in the UAA do not meet the definition of intermittent listed in 20.6.4.7 NMAC, "the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow." It was found that the hydrogeologic and stream flow conditions *do* meet the following definition of ephemeral listed in 20.6.4.7 NMAC, "the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region."

The UAA recommends and proposes changing the classification of the Rio Grande to Four Hills reach of Tijeras Arroyo from intermittent to ephemeral. Geology was identified as the primary factor causing the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo to be ephemeral. The thick sequence of unconsolidated sediment in the Albuquerque Basin and the deep-water table promote rapid infiltration of surface water, depleting any base flows that might originate from the shallow bedrock water table located upstream. While perennial and intermittent flow occurs upstream in the Four Hills Bridge to headwaters reach these flows infiltrate rapidly at the boundary between bedrock and basin fill a short distance upstream of the Rio Grande to Four Hills Bridge reach.

Finally, it should be noted that NTESS does not seek, anticipate, or contemplate any new discharges to Tijeras Arroyo or changes to our operations that would alter the volume or quality of stormwater discharged from SNL/NM. Our interest in changing the designation from intermittent to ephemeral is purely to enable regulatory compliance based on actual hydrologic conditions on the ground.

UAA Public Involvement

After completion of formal studies for purposes of the UAA, NTESS conducted public outreach and involvement to inform stakeholders and the surrounding community about the results of the UAA, and to elicit public comment. A public notice was issued on February 8, 2025, to announce the beginning of a 60-day comment period ending on April 10, 2025. Public comments could be submitted directly to NTESS via the environmental website, direct e-mail to NTESS, or directly to NMED via the public comment portal.

NTESS also conducted a public meeting on March 5, 2025, at the New Mexico Veterans Memorial in Albuquerque, NM. The UAA documents were (and continue to be) available through the University of New Mexico Digital Repository website. After the comment period ended, no public comments were submitted and thus NTESS did not amend the UAA.

In addition to the formal public comment period, NTESS contacted stakeholders including the Pueblo of Isleta, Kirtland Airforce Base, Albuquerque Metropolitan Area Flood Control Authority, Bernalillo County (Natural Resource Services; Open Space), the City of Albuquerque (Open Space Division; Stormwater Section), Ciudad Soil and Water Conservation District, Tijeras Creek Watershed Initiative, The Nature Conservancy, U.S. Geological Survey, U.S. Fish and Wildlife

Service, U.S. EPA, NM Department of Transportation (District 3), and the New Mexico Environment Department. NTESS informed the stakeholders of the plan to petition to change the Tijeras Arroyo designation and included the UAA Report in communications. NTESS offered meetings with stakeholders, however no stakeholders requested a meeting.

Conclusion

In conclusion, the Use Attainability Analysis conducted by NTESS between 2018 and 2023 demonstrates that the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo meets the definition of an ephemeral water body under 20.6.4.97 NMAC. The study found that flow in the reach occurs only briefly in direct response to precipitation, the channel lies above the regional water table, and there is an absence of hydric soils, springs, aquatic organisms, and riparian vegetation, all of which are consistent with ephemeral conditions. Geology was identified as the primary factor influencing these characteristics, as upstream flows rapidly infiltrate through unconsolidated basin-fill sediments. The UAA focused on factor (2) of 40 CFR 131.10(g), showing that natural flow conditions prevent attainment of uses associated with an intermittent classification. No operational changes or new discharges are proposed; the goal is to align regulatory designations with actual hydrologic conditions. Following public outreach and a 60-day comment period with no comments received NTESS petitioned the Commission on June 6, 2025, to amend 20.6.4.97 NMAC to reclassify the reach from intermittent to ephemeral. This concludes my written testimony, thank you.

/s/ John Kay
John Kay

NTESS Exhibit 3

Use Attainability Analysis for Tijeras Arroyo: Rio Grande to Four Hills Bridge Reach

(Assessment Unit NM-9000.A_070)

Sandia National Laboratories

U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
Albuquerque, NM

June 2023

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia,

LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND#: SAND2022-11257O

Table of Contents

List of Appendices 3

List of Acronyms 4

Units of Measure 4

1.0 Introduction 5
- 1.1 Designated Uses Being Evaluated 5
- 1.2 Revision History of This UAA 5

2.0 Use Attainability Analysis 6

3.0 General Site Conditions 7
- 3.1 Watershed Boundaries 7
- 3.2 Geologic Setting 8
- 3.3 Topography 9
- 3.4 Climate 9
- 3.5 Ecoregions 10
- 3.6 Soils 11
- 3.7 Groundwater Conditions 11
  - 3.7.1 Fractured Bedrock Aquifer 12
  - 3.7.2 Albuquerque Basin Aquifer 12
  - 3.7.3 Perched Aquifer 12
  - 3.7.4 Groundwater-Surface Water Interaction 13
- 3.8 Surface Water Conditions 13
  - 3.8.1 Flow Gauging 14
  - 3.8.2 Water Quality 14
- 3.9 Land Use History 15
  - 3.9.1 Urbanized Areas 15
  - 3.9.2 Surface Declarations and Permits 15
  - 3.9.3 NPDES Permits 16
  - 3.9.4 Dams and Other Stream Modifications 17
- 3.10 Stream Channel Surveys 18

4.0 Antidegradation and Existing Uses 18
- 4.1 Existing Uses 19
- 4.2 Protection of Downstream Uses 19

5.0 Endangered and Threatened Species Review 20
- 5.1 Evaluation of Endangered and Threatened Species 20

6.0 Establishing Highest Attainable Use 21
- 6.1 Highest Attainable Designated Uses 22

7.0 Removal of a Designated Use 22
- 7.1 Proposed Designated Use Removals 22
- 7.2 Factors Preventing Attainment of the Current Designated Use 22
- 7.3 Demonstration that Designated Uses are Not Attainable 23

8.0 Quality Control and Quality Assurance 23
- 8.1 Training and Qualifications 23
- 8.2 Data Collection and Management 24
- 8.3 Document Review 25

9.0 Summary and Conclusions 25

Tables 27
Figures 36
References 55

List of Appendices

Appendix A Work Plan to Conduct UAA
Appendix B Regulatory Guidance Documents
Appendix C Climate Data
Appendix D Ecoregions Descriptions
Appendix E Soils Descriptions
Appendix F Groundwater Data
Appendix G Surface Water Data
Appendix H Historic Aerial Photos
Appendix I Hydrology Protocol Surveys
Appendix J Field Photographs
Appendix K ISO Standards

List of Acronyms

Acronym	Definition
AU	assessment unit
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
HUC	hydrologic unit code
KAFB	Kirtland Air Force Base
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NPDES	National Pollution Discharge Elimination System
NTESS	National Technology & Engineering Solutions of Sandia, LLC
SFO	Sandia Field Office
SNL/NM	Sandia National Laboratories, New Mexico
SWQB	Surface Water Quality Bureau
UAA	use attainability analysis
USGS	United States Geologic Survey

Units of Measure

Term	Definition
°F	degrees Fahrenheit
AF	acre-foot
AF/yr	acre-feet per year
bgs	below ground surface
CF	cubic foot
cfs	cubic feet per second
CF/yr	cubic feet per year
ft	foot
mm	millimeter
mph	miles per hour

1.0 Introduction

This use attainability analysis (UAA) was conducted for the Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo (AU NM-9000.A_070), located in Albuquerque, New Mexico (Figure 1). It was prepared by National Technology & Engineering Solutions of Sandia, LLC (NTESS) on behalf of the United States Department of Energy (DOE)/National Nuclear Security Administration (NNSA)/Sandia Field Office (SFO). NTESS is the management and operating contractor for Sandia National Laboratories, New Mexico (SNL/NM), and DOE/NNSA/SFO administers the SNL/NM contract. SNL/NM is located within the boundaries of Kirtland Air Force Base (KAFB), in Bernalillo County, New Mexico (Figure 1).

The Tijeras Arroyo is located in the Tijeras Arroyo Watershed, which is identified by a 10-digit hydrologic unit code (HUC); the watershed boundary is shown in Figure 2. The study area for this UAA includes the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) and adjacent portions of the Tijeras Arroyo Watershed having the potential to impact flows within the reach.

The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo is currently classified as an intermittent stream with designated uses of marginal warmwater aquatic life, primary human contact, livestock watering, and wildlife habitat. This document provides the technical rationale for reclassifying the reach as an ephemeral stream and describes why the reach cannot support its current designated uses.

DOE and NTESS intend to petition for an amendment of the reach's classification based on its highest attainable use through the standard rulemaking process for entities other than NMED in accordance with 20.6.4.15(E) NMAC.

1.1 Designated Uses Being Evaluated

The purpose of this UAA is to assess the highest attainable use associated with the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070), depicted in Figure 1, Figure 2, and Figure 3.

The designated uses associated with intermittent (20.6.4.98 NMAC) and ephemeral (20.6.4.97 NMAC) waters provided in 20.6.4.900 NMAC are listed in Table 1. As can be seen in Table 1, the difference in designated uses between intermittent and ephemeral waters are the aquatic life and human contact uses. Therefore, this UAA evaluates the aquatic life and human contact designated uses of the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo. This UAA demonstrates that the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo cannot support the current designated uses of marginal warmwater aquatic life and primary contact associated with intermittent waters and should be classified as ephemeral.

1.2 Revision History of This UAA

This UAA was initially conducted in accordance with a work plan dated October 23, 2017 that was approved by the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) on February 9, 2018. As described in that work plan, the NMED Hydrology Protocol (NMED 2011a) was used to evaluate whether the reach is ephemeral or intermittent in accordance

with 20.6.4.15(B) NMAC (20.6.4 NMAC), and a Draft UAA (v.1) dated December 18, 2019 was submitted to SWQB on June 8, 2020.

SWQB provided formal comments to DOE and NTESS on the December 18, 2019 draft UAA (v.1) in a letter dated September 21, 2021. Based on those comments, DOE and NTESS submitted a revised Draft UAA (v.2) dated July 14, 2022 to SWQB on August 23, 2022.

SWQB provided verbal review comments on the revised draft UAA (v2) to DOE in a phone call on October 23, 2022, during which an update to the work plan was requested. A revised Work Plan (v.2) (Appendix A-1) dated January 2023 was submitted to SWQB on October 31, 2022, and was subsequently approved by SWQB on March 8, 2023 (Appendix A-2). Formal comments on the second Draft UAA (v.2) were provided by SWQB on April 3, 2023.

This Draft UAA (v.3) addresses the comments received from NMED in the April 3, 2023 letter (Appendix A-3), and follows the most recently revised work plan (v.2).

2.0 Use Attainability Analysis

In accordance with 20.6.4.15(A) NMAC and 40 CFR 131.10(g), a UAA is required any time the criteria for a proposed designated use are less stringent than the criteria for the current designated use.

A UAA is a scientific study used to determine the factors affecting attainment of a designated use. There are three primary elements to a UAA. First, the proposed change in the designated use must be determined to have equal or more stringent criteria than the existing use. An existing use is defined under 20.6.4.7(E)(4) NMAC as those uses actually attained in a surface water of the state on or after November 28, 1975, whether or not it is a designated use. The designated use, whether current or proposed, shall not be less stringent than the existing use. Second, pending the findings from evaluating the existing use, a UAA must then demonstrate that a designated use is not attainable due to one of the factors identified under 40 CFR 131.10(g). Third, once it has been demonstrated that the designated use is not attainable, the highest attainable use must be determined. Defining the highest attainable use requires evaluation of existing uses, biotic and abiotic conditions, anthropogenic influences, and consideration of protected status delegations.

A UAA must demonstrate that attainment of a designated use is not feasible based on at least one of the factors identified in 40 CFR 131.10(g):

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or
(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
(6) Controls more stringent than those required by sections 301(b) and 306 [technology-based effluent limitations] of the Act would result in substantial and widespread economic and social impact.

40 CFR 131.10(g)(2) allows states to remove a use that is not an existing use if the State or other entity conducts a use attainability analysis as specified in paragraph (j) of 40 CFR 131.10(j) that demonstrated attaining the use is not feasibly because of one of the six factors in 40 CFR 131.10(g).

Factor 2 above [40CFR 131.10(g)(2)] is the primary focus of this UAA. Flow in the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) occurs infrequently, briefly, and only in direct response to precipitation (stormwater runoff).

3.0 General Site Conditions

There has been substantial environmental characterization conducted at SNL/NM and in surrounding areas close to Tijeras Arroyo over the last 40 or more years. Much of the information presented in this section was obtained from the following documents:

- *SNL/NM Site-Wide Hydrogeologic Characterization Project* (SNL/NM 1994)
- *Annual Groundwater Monitoring Report, Calendar Year 2018* (SNL/NM 2019)
- *2020 Annual Site Environmental Report for Sandia National Laboratories, New Mexico* (SNL/NM 2020)

3.1 Watershed Boundaries

Tijeras Arroyo is the main surface drainage feature of the Tijeras Arroyo Watershed. The watershed comprises an area of roughly 132 square miles in Bernalillo County in central New Mexico. It is approximately 24 miles long, drains portions of the west slopes of the Sandia and Manzano mountains, and discharges into the Rio Grande (Figure 2).

The Tijeras Arroyo Watershed (HUC 1302020302) (Figure 2) is divided into three sub-watersheds as depicted in Figure 3:

- Upper Tijeras Arroyo Sub-watershed (HUC 130202030201)
- Middle Tijeras Arroyo Sub-watershed (HUC 130202030202)
- Lower Tijeras Arroyo Sub-watershed (HUC 130202030203)

The upper sub-watershed is located within the western slopes of the Sandia and Manzano mountains, to the east and north of KAFB. The middle sub-watershed is located primarily within Tijeras Canyon but extends a short distance into the Albuquerque Basin (see Section 3.2). The lower sub-watershed is completely within the Albuquerque Basin.

The Tijeras Arroyo channel is relatively steep and narrow in the upper watershed, but in the middle and lower watersheds the gradient decreases and the channel becomes wider as it leaves the mountainous terrain and enters the Albuquerque Basin. In parts of the upper and middle sub-watersheds, perennial conditions exist; however, nothing close to perennial conditions are found in the lower sub-watershed. Significant geologic differences exist between the three sub-watersheds, which largely accounts for the differences in flow regime (see Section 3.2 and Section 3.7).

The Rio Grande to Four Hills Bridge reach exists primarily in the Lower Tijeras Arroyo Sub-watershed but extends a short distance into the lower part of the middle watershed (Figure 3). The only significant tributary to the Rio Grande to Four Hills Bridge reach is the Arroyo del Coyote, which drains a portion of the Manzano Mountains, including Madera Canyon, Lurance Canyon, and Sol se Mete Canyon. The Arroyo del Coyote joins Tijeras Arroyo at the upstream extent of the lower sub-watershed (Figure 3).

3.2 Geologic Setting

Tijeras Arroyo is located within a geologic setting that has been subjected to relatively recent episodes of basaltic volcanism and ongoing regional rifting (crustal extension). The Rio Grande Rift has formed a series of connected down-dropped basins filled with sedimentary deposits that are coincident with the path of the Rio Grande. The Rio Grande Rift extends from north to south for about 450 miles from Leadville, Colorado, through New Mexico and into Chihuahua, Mexico.

The Albuquerque Basin (Figure 4) is one of several north–south-trending sediment-filled basins formed by the Rio Grande Rift. The Rio Grande has been an aggrading stream for much of its history and has filled the Albuquerque Basin with up to 10,000 feet of alluvial sediments. Sediments are divided into two separate geologic units: the Santa Fe Group and Quaternary alluvium. Santa Fe Group sediments are characterized by poorly to moderately consolidated alluvial and colluvial deposits ranging in size from boulders to clays. Quaternary alluvium overlying deposits of the Santa Fe Group were deposited as a series of coalescing alluvial fans extending westward from the base of the mountains. These sediments range from poorly sorted mudflow material to well-sorted stream gravel.

There are three distinct hydrologic zones underlying the Tijeras Arroyo Watershed: (1) the fractured bedrock system of the foothills and mountains, (2) the Tijeras Fault Complex, and (3) the Albuquerque Basin (Figure 5). The headwaters of Tijeras Arroyo are located in the bedrock zone; from there the arroyo flows through the Tijeras Fault Complex and into the Albuquerque Basin.

The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo is located entirely within the Albuquerque Basin hydrologic zone. Within the Albuquerque Basin is a large regional aquifer that lies approximately 500 ft below ground surface (bgs). A small localized perched aquifer lies approximately 200 ft above the regional aquifer below portions of KAFB and SNL/NM. Figure 6

provides a generalized three-dimensional representation of geologic conditions under the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo.

Geology is the primary control on how much surface flow occurs in Tijeras Arroyo. In the bedrock hydrologic zone, downward migration of surface flow is slow due to the bedrock's relatively low permeability; flows are largely sustained through this reach. In the Albuquerque Basin hydrologic zone, downward migration of surface flow is rapid due to the relatively high permeability of the basin fill sediments; flows are largely depleted through this reach. Additional discussion of the local hydrogeology is provided in Section 3.7.

3.3 Topography

Tijeras Arroyo is set in the high desert region of central New Mexico. The most prominent local topographic features are the Sandia and Manzano mountains. The Sandia Mountains form a 13-mile-long escarpment distinguished by steep cliffs, pinnacles, and narrow canyons; the tallest point is Sandia Crest at 10,678 ft. The Sandia Mountains are separated from the Manzano Mountains (to the south) by Tijeras Canyon, through which Tijeras Arroyo flows. West of the mountains lies a broad upland bench called the Llano de Sandia. The Rio Grande lies approximately 10 miles west of the mountain front. The mountains in the east and the plains to the west create a diverse range of geological, hydrological, ecological, and climatic settings.

The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo is located west of the mountains on Llano de Sandia high desert grasslands. The topography of the Llano de Sandia is gently sloping to level. Elevations range from approximately 5,800 ft above mean sea level along its eastern extent to approximately 5,300 ft above mean sea level along its western extent (Figure 7). The predominant direction of surface drainage is from the east to the west with an average slope of about 2.5%; however, localized drainage directions vary. The average slope of the Rio Grande to Four Hills Bridge reach channel was estimated using a geographic information system to be approximately 1.5%. The channel gradient is fairly consistent along the entire reach; however, it is slightly higher at the top of the reach (approximately 1.7%) than it is at the bottom of the reach (approximately 1.3%).

3.4 Climate

Large diurnal temperature ranges, summer monsoons, and frequent drying winds are characteristic of the Albuquerque Basin. Temperatures are typical of mid-latitude dry continental climates with summer high temperatures in the basin of approximately 90°F and winter high temperatures around 50°F. Daily low temperatures range from approximately 60°F in the summer to approximately 20°F in the winter. The dry continental climate also produces low average humidity in the late spring and summer prior to the onset of the monsoon season. Daytime relative humidity can be between 10% and 20% in the spring and early summer, with an average humidity near 30%. Winter relative humidity averages near 50%.

Site-specific meteorology is influenced by proximity to topographic features, such as mountains, canyons, and arroyos. These features influence local wind patterns across the site. Canyons and arroyos tend to channel or funnel wind, whereas mountains create an upslope–downslope diurnal pattern to wind flows. Winds tend to blow toward the mountains or up the Rio Grande Valley

during the day, and nocturnal winds tend to blow down the mountains toward the Rio Grande Valley. These topographically induced wind flows can be enhanced or negated by weather systems that move across the southwestern United States. The strongest winds occur in the spring when monthly wind speeds average 10.3 mph. Wind gusts commonly reach 50 mph.

Precipitation varies across the area with many locations in the higher elevations of the mountains receiving annual rainfall twice that of locations in the Albuquerque Basin. Nearly all of SNL/NM west of the foothills is considered to be arid, receiving less than 10 inches of rain annually. Some remote test areas in the mountains and foothills may have annual rainfall in excess of 10 inches. Data collected at SNL/NM meteorological Tower A21 (located one-half mile from Tijeras Arroyo; see Figure 2) from 1994 to 2018 indicate an average annual rainfall of 8.61 inches (Figure 8). Approximately 61% (approximately 5.3 inches) of the average annual rainfall occurs during four months of the year: July, August, September, and October (Figure 8; also see Appendix C). Precipitation during these months is mainly in the form of brief, heavy monsoonal storm events. The winter season in the Albuquerque Basin is generally dry, with an average of less than two inches of precipitation falling between December and February.

Summer monsoonal storm cells generally develop over relatively small, localized areas. It is common to receive substantial rainfall in part of the Tijeras Arroyo Watershed and none at all in other parts of the watershed. Significant differences in rainfall can be observed in weather stations located less than one mile apart.

3.5 Ecoregions

Ecoregion data were obtained from the United States Forest Service (Griffith et al. 2006).

The mountainous eastern portion of the Tijeras Arroyo Watershed (Four Hills Bridge to headwaters reach) is located primarily within Level III Ecoregion 23, Arizona/New Mexico Mountains. Two Level IV ecoregions exist within the Arizona/New Mexico Mountains ecoregion: 23e, Conifer Woodlands and Savannas, and 23f, Rocky Mountain Conifer Forests.

The western portion of the Tijeras Arroyo Watershed, which includes the Rio Grande to Four Hills Bridge reach, is located primarily within Level III Ecoregion 22 (Arizona/New Mexico Plateau). The Arizona/New Mexico Plateau is comprised of two Level IV ecoregions: 22m, Albuquerque Basin, and 22g, Rio Grande Floodplain. The boundaries of these ecoregions are depicted in Figure 9, and additional detail is provided in Appendix D.

The Arizona/New Mexico Plateau Ecoregion (22) represents a large transitional region between the drier shrublands and wooded higher-relief tablelands of the Colorado Plateaus (20) in the north; the lower, hotter, less-vegetated Mojave Basin and Range (14) in the west; and forested mountain ecoregions that border the region on the northeast (21) and south (23). Local relief in the region varies from a few feet on plains and mesa tops to well over 1,000 ft along tableland side slopes. The Continental Divide splits the region, but it is not a prominent topographic feature. The region extends across northern Arizona, northwestern New Mexico, and into Colorado in the San Luis Valley. Gunnison prairie dogs are a keystone species in many of the sagebrush ecosystems, and their burrows provide habitat for other wildlife, including burrowing owls, weasels, badgers, and a variety of snakes.

The Albuquerque Basin (22m) is lower in elevation, drier, and warmer than surrounding Level IV ecoregions to the north, east, and west. The basin is filled with thick sediments of mostly Quaternary and some Tertiary age, with a few areas of volcanic rocks and lava-capped mesas. Extending from the La Bajada Escarpment on the north to near Socorro in the south, the region contains some diverse features and transitional characteristics. Unlike most of Ecoregion 22, which has mesic soils, 22m has a largely thermic soil temperature regime with a mix of sand scrub and desert grassland vegetation. Native vegetation includes black grama, sand dropseed, mesa dropseed, blue grama, galleta, sand sage, alkali sacaton, threeawns, and scattered yucca. Juniper occurs primarily in the north. Urban and suburban land uses are spreading.

The portion of Tijeras Arroyo that is within the Rio Grande Floodplain ecoregion (22g) has been channelized and lined with concrete for flood control and stabilization.

3.6 Soils

Soil maps were obtained from the National Resources Conservation Service National Cooperative Soil Survey Web Soil Survey (USDA 1977) (Figure 10). Detailed descriptions of the most prominent units are provided in Appendix E. Essentially all the active channel in the Rio Grande to Four Hills Bridge reach and much of the floodplain are comprised of Gila fine sandy loam. Gila fine sandy loam is classified under the hydrologic soil group B, which is sandy loam soils with moderately fine to moderately coarse textures. The National Cooperative Soil Survey describes Gila fine sandy loam as being derived from igneous and sedimentary rock, occurring in alluvial fans and floodplains (Appendix E). The typical profile consists of 0–7 inches of fine sandy loam, underlain by stratified gravelly loam to silt loam from 7–60 inches bgs. It is well drained, has a runoff classification of low, and the available water storage within its profile is about 10.5 inches. The most restrictive (slowest) transmitting layer is classified as moderately high to highly permeable with a hydraulic conductivity of 0.60 to 2.00 inches per hour. The physical characteristics of Gila fine sandy loam promote rapid downward infiltration of surface water.

A number of additional soil series are present in upland areas immediately surrounding the Tijeras Arroyo floodplain; some of the more prevalent are the Bluepoint, Embudo, Latene, Madurez, Tijeras, and Wink (Figure 10). These soils are similar in composition and structure to Gila fine sandy loam; all are classified as group B soils under the hydrologic soil grouping scheme. With little exception, the soils in and around Tijeras Arroyo promote rapid infiltration, which decreases runoff and thus flow to and within the stream channel.

3.7 Groundwater Conditions

There are three distinct hydrogeologic zones within the Tijeras Arroyo Watershed: (1) the fractured bedrock system of the foothills and mountains, (2) the Tijeras Fault Complex, and (3) the Albuquerque Basin (Figure 5).

The predominant direction of groundwater flow is from east to west. The Tijeras Fault Complex is a transition zone that separates the fractured bedrock system on the east from the Albuquerque Basin on the west (Figure 5). East of the Tijeras Fault Complex, the hydrogeology is characterized by fractured and faulted bedrock with depths to groundwater ranging from 45 to 325 ft bgs. On the west side of the Tijeras Fault Complex, the hydrogeology is characterized by unconsolidated

sediments of the Santa Fe Group with depths to groundwater ranging from approximately 200 to 570 ft bgs (Figure 11 and Figure 12; Appendix F). The Albuquerque Basin contains a substantial regional aquifer that provides potable water to the Albuquerque metropolitan area. A small, perched aquifer related to anthropogenic activity has also been identified, but it has been declining steadily over the past several decades and is expected to be dewatered completely within 20 years.

3.7.1 Fractured Bedrock Aquifer

Groundwater in the fractured bedrock system generally flows west out of the canyons toward the Tijeras Fault Complex. The groundwater gradient is relatively steep, 0.03 feet per foot (feet of vertical change per foot of horizontal distance). Across the Tijeras Fault Complex the change in the groundwater elevation is 350 feet; the steep gradient suggests that westward groundwater flow is retarded by the Tijeras Fault Complex. The hydrogeology in this area is poorly understood due to the complex geology created by the fault systems. On the east side of the Tijeras Fault Complex, depth to groundwater ranges from about 45 to 325 ft bgs. Most non-potable water supply and monitoring wells east of the faults are completed in fractured bedrock at relatively shallow depths and produce modest yields of groundwater.

3.7.2 Albuquerque Basin Aquifer

West of the Tijeras Fault Complex, within the sediments of the Albuquerque Basin, the Regional Aquifer lies at approximately 500 ft bgs. Within the Regional Aquifer, the gradient is relatively low, averaging about 0.005 feet per foot. The historic direction of regional groundwater flow within the basin was westward from the mountains toward the Rio Grande. Due to groundwater pumping by KAFB, the Veterans Administration Hospital, and Albuquerque Bernalillo County Water Utility Authority production wells, a depression in the Regional Aquifer has been created originating at the well fields near the northwest corner of KAFB. The impact of the seasonal variation in water production by both KAFB and Albuquerque Bernalillo County Water Utility Authority wells can be observed as minor fluctuations in the groundwater elevations of some SNL/NM and KAFB monitoring wells as far to the southeast as Technical Area III. Pumping and associated decreased groundwater levels have had no effect on surface flows in the Tijeras Arroyo, as there are hundreds of feet separating the stream channel from the shallowest groundwater.

3.7.3 Perched Aquifer

A diminishing Perched Groundwater System lies above the Regional Aquifer in a portion of northern KAFB (Figure 6). The Perched Groundwater System flows from west to east (opposite of the regional groundwater flow direction), from roughly the eastern extent of the KAFB airfield to the KAFB golf course. It extends north to approximately Southern Boulevard and south to Tijeras Arroyo. The perching layer is discontinuous in the vicinity of the golf course, where perched water drains to the regional aquifer. Depth to water in the perched zone averages 300 ft bgs. Possible recharge sources for the Perched Groundwater System are Tijeras Arroyo, golf course irrigation, landscape watering, water leakage from utility distribution lines, former septic system discharges, and infiltration from a former unlined KAFB wastewater treatment lagoon system (SNL/NM 1998). Water table elevations in the perched zone have been decreasing over the past 20 years, with trends suggesting that complete dewatering of the perched zone may occur sometime near 2040.

3.7.4 Groundwater-Surface Water Interaction

The depth to first groundwater (perched zone) beneath the Tijeras Arroyo channel is approximately 200 ft bgs. Where the perched aquifer is not present, the depth to first groundwater is as much as 500 feet bgs. Due to the substantial distance from ground surface to the water table, groundwater does not contribute to flow in the Rio Grande to Four Hills Bridge reach.

Groundwater recharge to the Albuquerque Basin occurs primarily along the eastern mountain front and along the major arroyos (SNL/NM 1998). The amount of recharge occurring in the foothills and canyons is not well characterized. Recharge for the portion of Tijeras Arroyo on KAFB was estimated to be approximately 2.2 million CF/yr (50 AF/yr) (SNL/NM 1998). The same study estimated the groundwater recharge associated with Arroyo del Coyote to be about 0.4 million CF/yr (9.2 AF/yr). This recharge occurs exclusively during storm (precipitation) runoff events.

The Rio Grande to Four Hills Bridge reach is a losing stream; surface water infiltrates through the channel bottom and percolates downward to the water table. There is no evidence to suggest that the water table historically intersected ground surface or otherwise promoted flow within the Arroyo. To illustrate the historically deep water table, representative hydrographs from along the Rio Grande to Four Hills Bridge reach are provided in Appendix F.

3.8 Surface Water Conditions

The Rio Grande is the major surface hydrologic feature in central New Mexico. The Rio Grande originates in the San Juan Mountains of Colorado and terminates at the Gulf of Mexico, near Brownsville, Texas. The Rio Grande has a total length of 1,760 miles and is the third-longest river system in North America.

Tijeras Arroyo discharges to the Rio Grande (Figure 2) and drains the Tijeras Arroyo Watershed (Section 3.1). The only significant tributary to the Tijeras Arroyo is the Arroyo del Coyote, which intersects Tijeras Arroyo at the top of the Lower Tijeras Arroyo Sub-watershed (Figure 3). Both Tijeras Arroyo and Arroyo del Coyote carry significant runoff after heavy thunderstorms that usually occur from June through August. Tijeras Arroyo, above the confluence with Arroyo del Coyote, drains about 80 square miles, while Arroyo del Coyote drains about 39 square miles (USACE 1979). The total watershed for Tijeras Arroyo is approximately 132 square miles.

The Tijeras Arroyo channel is relatively narrow and steep in the upper and middle watersheds, but it flattens and widens as it leaves the igneous and metamorphic terrain and enters the poorly consolidated sediments that comprise the Albuquerque Basin. This change in channel morphology and bed material results in a significant increase in infiltration potential. While portions of the upper and middle Tijeras Arroyo have been observed to support flow throughout the year, flow within the lower watershed occurs only for brief periods in response to rainfall and snowmelt.

Several springs on KAFB are associated with the uplifts in the Tijeras Fault Complex and in the Foothills and Canyons hydrogeologic areas (14): (1) Coyote Springs, Cattail Springs, and G Spring within Arroyo del Coyote, (2) Burn Site Spring in Lurance Canyon, and (3) Sol se Mete Spring within the Manzanita Mountains. Hubbell Spring (a perennial spring) is located just south of KAFB on Isleta Pueblo. Coyote Springs and Sol se Mete are perennial springs (continuously flowing), while

the others are ephemeral springs. When flowing, the springs produce surface flows that only last for a short distance, on the order of tens or perhaps hundreds of feet. The springs do not contribute flow to the Tijeras Arroyo.

3.8.1 Flow Gauging

Flow data are available from only one flow gauge within the reach—the United States Geologic Survey (USGS) Station 08330600 in Tijeras Arroyo near Albuquerque (. Station 08330600 is located approximately 1.5 miles upstream of the confluence of Tijeras Arroyo with the Rio Grande (Figure 14). The station has a nearly 37-year period of record spanning from September 1982 to the present (May 1, 2019, for this report) (Figure 15). Data since October 1, 2017 are provisional, and there are a number of periods prior to that where data does not exist or has not been approved for publication. Most of the days with missing data occurred during the winter months when flow is less likely to occur. Out of the 13,353 days since the period of record began, there are 9,933 days of flow data approved for publication. The following description of flow frequency is based on those 9,933 days. The complete data set used for the analysis in this report is provided in Appendix G.

Over the period of record, the average number of days per year in which flow at the gage was measured above zero is 37.7 (10.3% of days). The breakdown by month is provided in Table 2 . The percentage of days in each month with measurable flow is depicted graphically in Figure 15.

As can be seen, the months with the highest flow frequency are the summer monsoonal months of July and August. During these months, flow occurs approximately six days per month. During the reminder of the year, flows occur during roughly two to three days of each month. Occasional large releases from broken water mains, well development, hydrant flushing, or other anthropogenic activities may occur; however, runoff from precipitation is by far the largest contributor of flow to the arroyo. Due to the spatial and temporal variability in rainfall that occurs in Albuquerque, correlations between individual flow and precipitation events for specific days and monitoring stations are difficult to establish. However, comparison of monthly averages, which help smooth out the random spatial distribution of monsoonal storm cells, shows a strong correlation between the number of monthly precipitation events and the number of flow events (Figure 16). 6 illustrates that flow frequency increases linearly with precipitation frequency, indicating that flow is closely tied to precipitation.

The frequency of flow measured at the USGS gage is higher than expected by NTESS staff who work near and see the Tijeras Arroyo daily. It is possible that flows occur more frequently at the gage than it does in the vicinity of SNL/NM; there are considerable urbanized areas downstream that could be contributing flow to the arroyo. However, there are no data available to support this observation.

3.8.2 Water Quality

A data search was conducted through the EPA Water Quality Portal via the Water Quality Exchange to characterize water quality in Tijeras Arroyo and downstream receiving waters (Rio Grande). There were no water quality data available for AU NM-9000.A_070.

Limited water quality data for Tijeras Arroyo and the Rio Grande below Tijeras Arroyo was obtained from the Albuquerque Metropolitan Area Flood Control Authority (AMAFCA). Data were collected by AMAFCA and other local agencies as part of stormwater permit compliance

activities. The monitoring station for Tijeras Arroyo is located approximately 1.5 miles upstream of the Rio Grande, and the monitoring station for the Rio Grande is located just upstream from Isleta Pueblo. There are some notable differences in water quality, primarily for total suspended solids, metals, and nutrients (Table 3).

The overall impact of Tijeras Arroyo water quality on the Rio Grande is likely negligible due to the comparatively small amount of water contributed by Tijeras Arroyo. The average annual flow of Tijeras Arroyo at USGS station 08330600 is approximately 0.38 cfs, and the annual average flow of the Rio Grande at USGS station 08330875 (near Isleta Lakes) is roughly 700 cfs. That means Tijeras Arroyo contributes about 0.05% of the flow in the Rio Grande below Tijeras Arroyo. It is very unlikely that Tijeras Arroyo has or will have in the future, any significant impact on flow volume or water quality within the Rio Grande.

3.9 Land Use History

There are numerous human-related disturbances throughout the Lower Tijeras Arroyo Watershed, including but not limited to land clearing, mining, urbanization, roads and road construction, livestock grazing, off-road vehicle use, and vegetation conversion. There are signs of historic small-scale irrigation for agriculture, but irrigated agriculture has not occurred in recent history. Due to the increase in impervious surfaces associated with urbanization, it is likely that more runoff occurs in Tijeras Arroyo under current conditions than occurred under predevelopment conditions.

Even though anthropogenic disturbances can affect water quality, current land use and history do not provide direct evidence to support or refute changing the established designated uses. The Lower Tijeras Arroyo Watershed, regardless of anthropogenic influences, is not able to attain the established designated uses for primary contact and limited warmwater aquatic life. Therefore, the potential anthropogenic impacts on water quality are not a factor in this UAA, which is basing the replacement of designated uses on natural, low-flow conditions.

3.9.1 Urbanized Areas

There are significant urbanized areas adjacent to and within the stream channel of the Rio Grande to Four Hills reach of Tijeras Arroyo. These are documented in additional detail in Section 3.10.

Urbanization likely increases the amount of flow that occurs in Tijeras Arroyo due to the increase in impervious surfaces draining to the arroyo; however, these additional flows are insufficient to support the designated uses associated with intermittent waters (primary contact limited warmwater aquatic life). Discharges from urban areas are irregular and do not provide a consistent source of water to offset the non-perennial nature of the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo. See Section 3.8.1 for additional discussion of flow.

Anthropogenic disturbances can also affect water quality due to impervious surfaces and pollution of stormwater runoff. However, water quality is not the basis for questioning the ability of this reach to support the designated uses. See Section 3.8.2 for additional discussion of water quality.

3.9.2 Surface Declarations and Permits

The New Mexico Office of the State Engineer (OSE) is the agency responsible for issuing surface water declarations and permits, also known as "water rights." A water right is a legal right, issued as

a permit or declaration to utilize water (19.26.2 NMAC). Some permits may involve hydrologic modifications, such as diversions. The flow regime of a stream, which is necessary for attaining the water quality associated with designated uses, is impacted by surface water diversions.

A stream with a diversion may signify that low flow is due to hydrological modifications and not due to natural causes. Therefore, if a non-perennial water contains a surface declaration or a permit with an associated existing designated use, then that water will retain its current designated use, at this time, because low flow could be due to anthropogenic hydrologic modifications and not natural causes.

DOE and NTESS conducted an Office of the State Engineer surface declaration and permit review to identify whether any permits exist within the reach. Permit data were obtained from the New Mexico Office of the State Engineer's Point of Diversions Open Data Site. No surface declarations or Office of the State Engineer permits for the diversion of surface water from the Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo were identified.

3.9.3 NPDES Permits

A review of the EPA NPDES Individual and Stormwater General Permits associated with the non-perennial sections was conducted to determine whether flows from permitted discharges could compensate the natural low-flow conditions.

The only NPDES-permitted discharges to the Tijeras Arroyo within the Rio Grande to Four Hills Bridge reach are stormwater discharges. All stormwater outfalls to the reach are permitted by the US EPA under the Middle Rio Grande Municipal Separate Storm Sewer System (MS4) Permit. Permitted discharges occur from SNL/NM, KAFB, the City of Albuquerque, and Bernalillo County. There are two permit holders for SNL/NM. SNL/NM is the facility; DOE has permit coverage as the facility owner, and NTESS has permit coverage as the operator.

Stormwater discharges to Tijeras Arroyo occur in direct response to rainfall and snowmelt; storm drains do not sustain flows beyond a brief period following a storm event. A total of eleven stormwater outfalls to Tijeras Arroyo were identified during this investigation (Figure 14); there may be some small outfalls that were not identified. SNL/NM has one permitted outfall on Figure 14 (#6) under permit numbers NMR04A011 (DOE) and NMR04A012 (NTESS). KAFB has three outfalls on Figure 14 (#7, #8, and #9) under permit number NMR04A009. The City of Albuquerque has three outfalls on Figure 14 (#5, #10, and #11) under permit number NMR04A014. Bernalillo County has 4 of the outfalls shown on Figure 14 (#1, #2, #3, and #4) under permit number NMR04A008.

A single additional NPDES permit allowing discharge to the reach exists for KAFB to discharge treated effluent from the Bulk Fuels Facility Cleanup Project to Tijeras Arroyo under emergency conditions, but it has never been used.

There are no other NPDES discharges to the reach, including from industrial sites or wastewater reclamation facilities. Based on this review, existing NPDES permits contribute runoff to Tijeras Arroyo for brief periods, but this runoff cannot generate consistent discharge to compensate for the ephemeral nature of flows in the reach.

3.9.4 Dams and Other Stream Modifications

Appendix H contains aerial photographs of the Rio Grande to Four Hills Bridge reach from six different years: 1935, 1951, 1959, 1982, 2002, and 2018. The 1935 photos are not used for close-up views of individual sub-reaches because the resolution was too low; however, the 1935 photo for the entire reach is useful for general comparison.

There has been substantial development adjacent to Tijeras Arroyo since 1935; the largest impacts have been residential housing construction in sub-reaches 7 and 8 and the expansion of facilities within KAFB and the Albuquerque International Sunport (airport) near reaches 5 and 6. Numerous stream channel and bank modifications have been implemented or been caused indirectly over the last approximately 75 years. Most of these changes have been erosion control projects, primarily for stabilizing the banks and channel. The following list describes the more notable modifications. The location of each modification is shown in 17, with numbers in the figure corresponding to numbers in the list:

Reach 8:

1. Four Hills Road bridge crossing
2. concrete drop structure immediately downstream of Four Hills Bridge
3. loose concrete rip-rap bank on both sides of the channel for most of the sub-reach
4. concrete bank on the south side of the channel

Reach 7:

5. bridge/road crossing and associated channel
6. encroachment on the north side of the channel from landfill
7. concrete bank on the south side of the channel

Reach 6:

8. concrete road crossing and low-flow diversion beneath the road
9. dirt road crossing

Reach 5:

10. bridge and associated channel
11. encroachment on the north side of the channel from landfill
12. concrete drop structure

Reach 4:

13. bridge
14. stabilized channel for bank and structure protection

Reach 3:

15. concrete drop structure
16. concrete drop structure

Reach 2:

17. grading to stabilize the bank layback
18. paved road crossing
19. bridge and associated channel

Reach 1:

20. I-25 bridge and associated channel stabilization

21. sediment detention basins
22. concrete lined channel

Although changes in the channel resulting from anthropogenic activities have occurred, there is no indication that they have diverted, retained, or otherwise decreased the frequency or magnitude of flows in the arroyo. There is no indication from aerial photographs or other available information that there are uses of surface water that no longer exist. Stormwater flow within the arroyo is likely to be greater today than it was under predevelopment conditions due to the increased area of impermeable surfaces (e.g., buildings, roads, and parking lots) that drain to the arroyo.

3.10 Stream Channel Surveys

This UAA is following the standard rulemaking process for changing designated uses described in 20.6.4.15 NMAC, and not the expedited Hydrology Protocol. However, stream channel surveys of Tijeras Arroyo were conducted using the Hydrology Protocol methods to provide additional characterization and information on hydrologic conditions in the reach.

The Hydrology Protocol was developed specifically to aid in differentiating intermittent and ephemeral water bodies. Hydrology Protocol surveys are guided by questions about the hydrological, geomorphic, and biological indicators of the persistence of water. A numeric scoring system enables ranking of aquatic life and human contact characteristics of the water body and provides an indication of whether the water is intermittent or perennial. The Hydrology Protocol methods indicate that a score of 9 or less (on a scale of 0–37.5) is an indication of ephemeral conditions, and a score above 12 is an indication of intermittent conditions (a score between 9 and 12 is considered to be a gray area requiring additional characterization).

Hydrology Protocol field surveys were conducted June 17–28, 2019. To ensure adequate characterization of the entire Rio Grande to Four Hills Bridge reach, the reach was divided into eight sub-reaches (Figure 18). Each sub-reach is approximately one mile long. The highest score for a single sub-reach was 8.5, the lowest score was 5.5, and the average score for the entire reach was 6.1, which all indicate ephemeral conditions.

A full discussion of the Hydrology Protocol surveys is provided in Appendix I. Scores for each rating factor for each sub-reach are provided in Appendix I-2. Pictures of the reach taken during channel surveys are provided in Appendix J.

4.0 Antidegradation and Existing Uses

New Mexico's antidegradation policy, codified under 20.6.4.8 NMAC, defines three tiers of protection against degradation. These include protections for existing uses (Tier 1); protections for high-quality waters that exceed levels necessary to support aquatic life, wildlife, and recreational uses (Tier 2); and protections for waters designated as Outstanding National Resource Waters (Tier 3). The antidegradation policy also requires an evaluation of downstream waters to ensure that their protections are also sustained, should a designated use amendment be supported.

The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo is a Tier 1 water, and it discharges into the Rio Grande, which is also a Tier 1 water. Therefore, anti-degradation evaluations in this UAA are based on Tier 1 requirements to protect existing uses.

4.1 Existing Uses

According to 40 CFR 131.3(e), the definition of existing uses "are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." In accordance with 40 CFR 131.10, a designated use must be at least as stringent as the existing use and be in accordance with 40 CFR 131.20. Additionally, in accordance with 20.6.4.15(A)(2) NMAC, a designated use cannot be removed if it is an existing use. Therefore, as part of this UAA, the existing uses were established to determine whether a designated use may be removed and to provide a baseline for establishing the highest attainable use.

The designated uses associated with intermittent (20.6.4.98 NMAC) and ephemeral (20.6.4.97 NMAC) waters provided in 20.6.4.900 NMAC are listed in Table 1. As can be seen in Table 1, the difference in designated uses between intermittent and ephemeral waters are the aquatic life and human contact uses.

Human contact in the reach is extremely limited. There are no opportunities for swimming, boating, or fishing.. The only potential human contact activity conceivably possible would be "wading". Therefore, the existing human contact use is "secondary contact" (can support activities involving human contact where risk of ingestion is minimal).

There is no presence of aquatic life in the reach. Therefore, the existing aquatic life use is "limited aquatic life" (can support limited aquatic life specifically adapted to rapidly changing environmental conditions).

The existing uses for human contact and aquatic life are consistent with the beneficial uses listed in 20.6.4.900 NMAC for ephemeral waters. These existing uses cannot support the beneficial uses listed in 20.6.4.900 NMAC for intermittent waters.

4.2 Protection of Downstream Uses

Pursuant to 40 CFR 131.10(b) "the state shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters". As discussed in Section 3.8.2 the current water quality in downstream waters is similar to water quality in Tijeras Arroyo.

The amendment of human contact and aquatic life uses in Tijeras Arroyo will still be protective of downstream waters (Rio Grande) because the current designated uses in Tijeras Arroyo are not attainable due to the low flow conditions. The change in designated uses will not promote or enable changes to existing uses or conditions within Tijeras Arroyo; rather, the change in designated uses will merely align designated uses with existing and attainable uses.

5.0 Endangered and Threatened Species Review

In accordance with Section 7(a)(2) of the Endangered Species Act, this action must not be likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species. In order to assist with that evaluation, the UAA includes a preliminary screening of listed threatened and endangered species within the geographical areas being analyzed for potential designated use changes. Since the highest attainable uses support the existing water quality, there will be no impacts to endangered or threatened species.

5.1 Evaluation of Endangered and Threatened Species

This UAA includes a review of the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) project planning tool to determine whether the geographical location of the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo overlaps with listed species or critical habitat. The Rio Grande in the vicinity where it joins the reach was included in the evaluation.

Appendix B contains the IPaC geographical area delineations, their descriptions, and their associated assessed IPaC map image. Based on the results from the assessed IPaC delineations, there are five species of threatened or endangered species within the Lower Tijeras Arroyo Watershed and in the receiving waters of the Rio Grande:

Mammals:

- New Mexico meadow jumping mouse (*Zapus hudsonius luteus*)
  - There is final critical habitat for this species. The location of the critical habitat is not available.
  - Species profile: U.S. Fish and Wildlife Service-7965
  - Status: Endangered

Birds:

- Mexican spotted owl (*Strix occidentalis lucida*)
  - There is final critical habitat for this species. The location of the critical habitat is not available.
  - Species profile: U.S. Fish and Wildlife Service-8196
  - Status: Threatened
- Southwestern willow flycatcher (*Empidonax traillii extimus*)
  - There is final critical habitat for this species. The location of the critical habitat is not available.
  - Species profile: U.S. Fish and Wildlife Service-6749
  - Status: Endangered
- Yellow-billed cuckoo (*Coccyzus americanus*)
  - There is proposed critical habitat for this species. The location overlaps the critical habitat.
  - Species profile: U.S. Fish and Wildlife Service-3911
  - Status: Threatened

Fishes:

- Rio Grande silvery minnow (*Hybognathus amarus*)

- There is final critical habitat for this species. The location overlaps the critical habitat.
- Population: Wherever found, except where listed as an experimental population
- Species profile: U.S. Fish and Wildlife Service-1391
- Status: Endangered

Based on GIS data referenced in the iPAC Report and obtained from the U.S. Fish and Wildlife Service, there is no critical habitat within or along Tijeras Arroyo. Critical habitat does exist, however, for the Silvery Minnow within the Rio Grande at the confluence of Tijeras Arroyo, as well as for miles upstream and downstream of the confluence (Figure 13).

Changing the designated uses in Tijeras Arroyo to reflect existing and attainable uses will not impact the silvery minnow because the current designated uses are not attainable; this UAA would not result in a change to existing or attainable uses, only designated uses. Therefore, since the silvery minnow currently inhabits the Rio Grande under existing conditions, and no degradation would result from a change in designated uses, there would be no impact to silvery minnow habitat.

There is also critical habitat in and adjacent to the Rio Grande for the Southwestern Willow Flycatcher, however, it is greater than 10 miles downstream of Tijeras Arroyo and is unlikely to be impacted by the proposed changes in designated uses, especially since existing or attainable uses will remain unchanged.

There is no indication that changing the classification of the Tijeras Arroyo from intermittent to ephemeral will jeopardize the habitat, existence, or overall health of any threatened or endangered species. The change would not jeopardize natural communities of conservation concern (e.g., emergent wetland, riverine wetland, prairie, and glade) because the Tijeras Arroyo does not currently support those community types. Additionally, as discussed in section 3.8, the overall impact of Tijeras Arroyo on critical habitat in the Rio Grande is likely negligible due to the small amount of water contributed by Tijeras Arroyo. Tijeras Arroyo contributes about 0.05% of the flow in the Rio Grande below Tijeras Arroyo. It is very unlikely that Tijeras Arroyo currently has, or will have in the future, any significant impact on critical habitat within the Rio Grande.

6.0 Establishing Highest Attainable Use

Once the factor that precludes the attainment of the use has been demonstrated, 40 CFR 131.10 requires the UAA to provide demonstration of the highest attainable use. The definition of highest attainable use can be found in 40 CFR 131.3(m):

> Highest attainable use is the modified aquatic life, wildlife, or recreation use that is both closest to the uses specified in section 101(a)(2) of the Act and attainable, based on the evaluation of the factor(s) in §131.10(g) that preclude(s) attainment of the use and any other information or analyses that were used to evaluate attainability. There is no required highest attainable use where the State demonstrates the relevant use specified in section 101(a)(2) of the Act and sub-categories of such a use are not attainable.

6.1 Highest Attainable Designated Uses

Due to limited ephemeral flows in response to stormwater run-off (40 CFR 131.10(g)), the highest attainable recreational use is secondary contact, which is defined in 20.6.4 NMAC as:

> any recreational or other water use in which human contact with the water may occur and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, commercial and recreational boating and any limited seasonal contact.

Due to limited ephemeral flows in response to stormwater run-off (40 CFR 131.10(g)), the highest attainable aquatic life use is limited aquatic life, which is defined in 20.6.4 NMAC as:

> the surface water is capable of supporting only a limited community of aquatic life. This subcategory includes surface waters that support aquatic species selectively adapted to take advantage of naturally occurring rapid environmental changes, ephemeral or intermittent water, high turbidity, fluctuating temperature, low dissolved oxygen content or unique chemical characteristics.

Both secondary contact and limited aquatic life uses are consistent with ephemeral waters as identified under 20.6.4.97 NMAC. It is also assumed that the reach can attain uses for livestock watering and wildlife habitat which are also consistent with 20.6.4.97 NMAC.

7.0 Removal of a Designated Use

According to 40 CFR 131.10, states can remove a designated use if it is not an existing use, and if the rationale for removal of a designated use falls under one of the six factors in 40 CFR 131.10(g) (presented in Section 2 of this UAA).

7.1 Proposed Designated Use Removals

Based on the evidence provided in this UAA, DOE and NTESS have concluded that ephemeral low flow conditions (the second factor in 40 CFR 131.10(g)) prevent attainment of the current designated uses in the Rio Grande to Four Hills reach of Tijeras Arroyo.

This UAA recommends and proposes changing the classification of the Rio Grande to Four Hills reach of Tijeras Arroyo from intermittent to ephemeral. This would result in removing the designated uses of primary human contact and marginal warmwater aquatic life and replacing them with the designated uses of secondary human contact and limited aquatic life (Table 1).

7.2 Factors Preventing Attainment of the Current Designated Use

Designated uses may be removed or amended to have less stringent criteria if a UAA can demonstrate that attaining the designated use is not feasible based on one of the six factors in 40 CFR 131.10(g). As discussed in Section 2.0, DOE and NTESS believe that the attainment of

current beneficial uses is not possible due to the second factor under 40 CFR 131.10(g), in this case, ephemeral low flow conditions.

> (2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met.

7.3 Demonstration that Designated Uses are Not Attainable

Natural low flow conditions or the lack of persistent water associated with the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo prevents the attainment of the current designated marginal warmwater aquatic life and primary human contact designated uses. Based on the information provided in this UAA, DOE and NTESS have concluded that in accordance with 40 CFR 131.10(g)(2) the current designated uses associated with intermittent waters are not attainable.

Fishing or boating is not attainable in the reach; the only potential recreational use would be wading, and even that would be limited to brief flows occurring during storm events. Therefore, the designated use of primary human contact is not attainable.

The reach is completely dry more than 90% of the time, and there was no evidence of aquatic life observed during field surveys. Therefore, the designated use of warmwater aquatic life in not attainable.

8.0 Quality Control and Quality Assurance

Environmental monitoring (which includes sampling) is conducted in accordance with program specific sampling and analysis plans, work plans, or quality assurance plans, which contain quality assurance elements. These documents meet applicable federal, state, and local requirements for conducting sampling and analysis activities. Personnel in various programs collect environmental samples and submit the samples for analysis of radiological and non-radiological constituents.

Project sampling and analysis plans (or equivalent) include critical elements, such as procedures for collecting samples, preserving and handling samples, controlling samples, controlling laboratory quality, setting required limits of detection, controlling field quality, ensuring health and safety, setting schedules and frequency for sampling, reviewing data, determining data acceptability, and reporting.

8.1 Training and Qualifications

This work was conducted by a multidisciplinary staff of environmental professionals including, geologists, hydrologists, water quality specialists, biologists, ecologists, meteorologists, geographers, GIS analysts, and field technicians. All staff hold degrees, and/or professional certifications relative to their field of expertise:

Team Member	SNL/NM Program	Primary UAA Role	Degree/Certification
John Kay	Stormwater	Project Lead/geology	MS Hydrology, Professional Geologist (CA)
Kathie Deal	Stormwater	Regulatory review	MS Environmental Science
Carolyn Daniel	Stormwater	Flow and water quality	Certified Professional in Erosion and Soil Control
Joe Fontana	Meteorology	Climate/precipitation	MS Atmospheric Sciences
Jennifer Payne	Ecology	Vegetation/aquatic life	MS Water Resources Management, BS Biology, Certified Ecological Restoration Practitioner (Society for Ecological Restoration)
Mike Skelly	Groundwater	Groundwater	MS Geology, Professional Geologist (WY)
Sonny Casaus	GIS	Geographic data/maps	GIS Certified Professional
Steven Toler	Surveyor	Stream channel surveys	BS Civil Engineering NM Registered Professional Land Surveyor

8.2 Data Collection and Management

All data used in this analysis were collected in accordance with the approved Work Plan. All methods and sources used to obtain data are documented. All data and information originating from outside Sandia National Laboratories were obtained from reliable sources, such as the US Fish and Wildlife Service, US Geologic Survey, and Kirtland Air Force Base. Data and information developed by Sandia underwent the quality control and quality assurance measures described in Section 10.2.1.

Sample collection, analysis request and chain-of-custody documentation, and measurement data are reviewed and validated for each sample collected. Analytical data reported by contract laboratories are reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to each program's method of compliance and data quality objectives. The data are validated at a minimum of three levels:

In addition to the three minimum validation levels, a technical assistance contractor may validate analytical data under direction of Sample Management Office personnel in accordance with applicable procedures and requirements. The purpose is to identify, through evaluation of supporting documentation, those monitoring results that do not meet the expected precision and accuracy of an analytical method. Groundwater monitoring data and Terrestrial Surveillance

Program data are validated by a technical assistance contractor providing this additional level of quality assurance.

All analytical data packages, analysis request and chain-of-custody documents, and data validation reports are submitted to a Sandia record depository for cataloging and storage in accordance with internal procedures, DOE requirements, and the document control requirements of ISO 9001, *Quality Management*, and ISO 14001, *Environmental Management Systems* (Appendix K).

8.3 Document Review

This document has undergone a thorough technical review by staff, legal counsel, and management at SNL/NM. All information, results, and conclusions have been reviewed to ensure they are accurate.

9.0 Summary and Conclusions

Based on the information presented in this UAA, the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) exhibits characteristics of an ephemeral water body. This conclusion is supported by historic and recent hydrologic, geomorphic, and ecologic indicators of flow as presented in this report. This conclusion is also supported by results of field surveys using the NMED Hydrology Protocol method for differentiating ephemeral and intermittent water bodies based on the designated uses supported by a water. The highest attainable aquatic life and human contact uses due to limited ephemeral flows are "limited aquatic life and secondary contact". The current designated uses of "marginal warmwater aquatic life and primary contact" are not attainable.

The only known sources of flow in the reach are direct stormwater runoff from localized storm events and small, irregular non-stormwater discharges from municipal activities (Section 3.8).

The historic record from a USGS flow gage near the bottom of the reach (Section 3.8.1 and Figure 14) indicates that flow is detected above 0 cfs on 5–25% of the days in a month, depending upon the time of year (Figure 15). Average daily flow above 1 cfs occurs between 2% and 15% of days, and average daily flow above 10 cfs occurs on 0–5% of days. There is a strong correlation between the number of flow events and the number of rain events that occur during each month of the year (Figure 16). Most flow occurs during the summer monsoon season.

Non-stormwater discharges occur sporadically during the year and for short durations. They are typically small and infiltrate quickly within the stream channel, rarely generating flow within the reach. It is exceedingly rare that non-stormwater discharges would be able to reach the Rio Grande. There are no other known permitted or unpermitted discharges to the reach (NPDES or otherwise).

Geology is the primary factor that causes the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo to be ephemeral. The thick sequence of unconsolidated sediment in the Albuquerque Basin

and the deep water table promote rapid infiltration of surface water, depleting any base flows that might originate from the shallow bedrock water table located upstream.

The hydrogeologic and stream flow conditions described in this UAA *do not meet* the following definition of intermittent listed in 20.6.4.7 NMAC:

> The water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow.

The hydrogeologic and stream flow conditions described in this UAA *do meet* the following definition of ephemeral listed in 20.6.4.7 NMAC:

> The water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region.

The Hydrology Protocol method for stream surveys was also used to evaluate the reach. There were no water, fish, macroinvertebrates, algae, hydric soils, seeps, springs, or iron-oxidizing bacteria found anywhere in the reach. Geomorphic characteristics of the reach—including channel structure, substrate sorting, floodplain dimensions, and sinuosity—were all indicative of ephemeral characteristics. Vegetation within and adjacent to the reach is similar in composition to upland vegetation outside the active floodplain. No riparian zones were encountered. The vegetation was characteristic of ephemeral conditions. Hydrology protocol scores for individual sub-reaches ranged from 4.0 to 8.0. The average score for the entire reach was 6.1. The Hydrology Protocol guidelines indicate that a score of 9 or less is an indication of ephemeral conditions.

Based on the designated use definitions provided in 20.6.4.7 NMAC (summarized in Table 1), the information developed during this study shows that the primary contact and limited warmwater aquatic life uses supported by intermittent waters are not supported by the Rio Grande to Four Hills Bridge reach. Fishing, boating, swimming, or other "intimate human contact involving considerable risk of ingestion" are not existing or attainable uses within the reach. Similarly, the frequency of the presence of water is not sufficient to support "aquatic life on a continuous annual basis." Regardless of any conceivable future anthropogenic influences, the reach is not able to attain the current designated uses for primary contact or limited warmwater aquatic life.

40 CFR 131.10(g)(2) allows states to designate a use or sub-category of a use, or remove a use that is not an existing use, if the State or other entity conducts a use attainability analysis as specified in paragraph (j) of 40 CFR 131.10(j) that demonstrated attaining the use is not feasibly because of one of the six factors in 40 CFR 131.10(g).

It is the conclusion of this use attainability analysis that the classification of the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo is consistent with ephemeral rather than intermittent waters. This is based on the historical, geomorphic, and ecological indicators of flow as well as field surveys using the NMED Hydrology Protocol. Accordingly, the recommendation is to change the stream type classification from intermittent to ephemeral, as allowed under 40 CFR 131.10(g)(2).

Tables

Table 1. Designated uses associated with intermittent and ephemeral waters in New Mexico (adapted from NMAC 20.6.4)

Water Type	Designated Use	Description
Intermittent	Livestock watering	Can be used as a water supply for livestock
	Wildlife habitat	Can be used by plants and animals
	Marginal warmwater aquatic life	Can support limited aquatic life on a continuous annual basis
	Primary human contact	Can support activities involving prolonged and intimate human contact involving considerable risk of ingestion
Ephemeral	Livestock watering	Can be used as a water supply for livestock
	Wildlife habitat	Can be used by plants and animals
	Limited aquatic life	Can support limited aquatic life specifically adapted to rapidly changing environmental conditions
	Secondary human contact	Can support activities involving human contact where risk of ingestion is minimal

Table 2. Occurrence of flow in Tijeras Arroyo from USGS Gage 08330600 (1984–2018)

Month	Number of Days in Record	Number of Days with Flow[1]	Percent of Days with Flow	Average Daily Flow Rate[2] (cfs)
January	512	37	7.2	0.11
February	467	34	7.3	0.25
March	799	38	4.8	0.13
April	977	63	6.5	0.24
May	1,020	71	7.0	0.19
June	984	64	6.5	0.24
July	987	208	21.0	0.55
August	956	198	20.7	1.76
September	928	120	12.9	0.86
October	967	89	9.2	0.09
November	775	56	7.2	0.07
December	561	47	8.4	0.10
Total	**9,933**	**1,025**	**10.0**	**0.38**

[1]Includes any measurable flow above 0 cfs.
[2]Average daily flow rate during days when flow occurs (does not include days in which flow does not occur).

Table 3. Summary of water quality data from Tijeras Arroyo and the Rio Grande 2014-2020.

Parameter	Units	Tijeras Arroyo		Rio Grande	
		Average	Samples	Average	Samples
pH	S.U.	6.64	12	7.24	12
Conductivity	µmhos/cm	197.83	12	344.26	12
Temperature	°C	18.76	12	18.13	12
Dissolved Oxygen	mg/L	6.09	12	7.08	12
Biochemical Oxygen Demand	mg/L	24.65	6	3.95	5
Chemical Oxygen Demand	mg/L	107.50	6	30.46	7
Total Suspended Solids	mg/L	14,303.33	6	1,089.33	8
Total Dissolved Solids	mg/L	362.50	8	301.44	8
Total Nitrogen	mg/L	16.44	9	2.06	8
Total Kjedahl Nitrogen	mg/L	11.18	9	1.93	7
Nitrate plus Nitrite	mg/L	3.76	7	0.67	5
Ammonia	mg/L	0.00	1	0.00	0
Total Phosphorous	mg/L	10.03	6	1.03	8
Dissolved Phosphorous	mg/L	0.37	5	0.36	8
Dissolved Copper	µg/L	4.04	8	1.63	7
Dissolved Lead	µg/L	7.20	3	0.58	4
Mercury	µg/L	0.15	10	0.03	10
E. coli	CFU/100 mL	1,725.83	10	4,131.58	14
Oil and Grease	mg/L	8.15	2	0.00	0
Hardness (as $CaCO_3$)	mg/L	151.25	8	154.55	10
Gross Alpha	pCi/L	15.78	4	22.53	6

S.U. = standard units

uhhos/cm = micromhos per centimeter

C = celsius

mg/L = milligrams per liter

CFU =coliform forming units

pCi = picocuries

Table 4. Sinuosity calculations

Sub-reach	Current Sinuosity (2018)	Predevelopment Sinuosity (1951)	Change
1	1.00	1.01	−0.01
2	1.17	1.08	0.09
3	1.22	1.13	0.09
4	1.41	1.21	0.20
5	1.12	1.19	−0.07
6	1.08	1.04	0.04
7	1.14	1.04	0.10
8	1.05	1.02	0.03
Entire reach	1.15	1.10	0.05

Table 5. Channel and floodplain dimensions

Transect Number	Sub-reach	Maximum Depth (ft)	Channel Width (ft)	Flood Prone Width (ft)	Floodplain to Channel Ratio
1	2	0.84	77.92	102.35	1.31
2	2	1.63	31.94	39.18	1.23
3	3	1.66	38.24	59.35	1.55
4	4	1.23	21.43	44.51	2.08
5	5	1.00	41.79	57.15	1.37
6	5	0.98	36.33	42.11	1.16
7	6	1.10	31.54	38.26	1.05
8	6	0.67	66.11	70.84	1.07
9	6	0.71	28.64	33.63	1.17
10	7	0.70	48.90	54.53	1.12
11	7	0.50	41.24	245.05	5.94
12	8	1.05	46.74	59.16	1.27
Median		**0.99**	**39.74**	**55.84**	**1.25**

Table 6. In-channel particle size distribution

Particle Class	Size Range (mm)	Count								
		Sub-reach 2	Sub-reach 3	Sub-reach 4	Sub-reach 5	Sub-reach 6-1	Sub-reach 6-2	Sub-reach 7	Sub-reach 8	Full Reach
Fines	< 0.5	17	20	11	13	20	24	19	4	128
Sand	0.5–2	62	53	44	18	19	11	26	18	251
Very fine gravel	2–4	13	22	20	38	30	29	32	41	225
Fine gravel	5–8	2	2	10	17	24	16	15	11	97
Medium gravel	9–16	5	3	7	7	5	8	7	13	55
Course gravel	17–32	1	0	4	7	2	6	1	8	29
Very course gravel	33–64	0	0	2	0	0	4	0	3	9
Small cobble	65–90	0	0	1	0	0	0	0	1	2
Medium cobble	91–128	0	0	1	0	0	2	0	0	3
Large cobble	129–256	0	0	0	0	0	0	0	1	1
Small boulder	257–512	0	0	0	0	0	0	0	0	0
Medium boulder	513–1,024	0	0	0	0	0	0	0	0	0
Large boulder	> 1,025	0	0	0	0	0	0	0	0	0

Particle Class	Size Range (mm)	Percent								
		Sub-reach 2	Sub-reach 3	Sub-reach 4	Sub-reach 5	Sub-reach 6-1	Sub-reach 6-2	Sub-reach 7	Sub-reach 8	Full Reach
Fines	< 0.5	17	20	11	13	20	24	19	4	16.00
Sand	0.5–2	62	53	44	18	19	11	26	18	31.38
Very fine gravel	2–4	13	22	20	38	30	29	32	41	28.13
Fine gravel	5–8	2	2	10	17	24	16	15	11	12.13
Medium gravel	9–16	5	3	7	7	5	8	7	13	6.88
Course gravel	17–32	1	0	4	7	2	6	1	8	3.63
Very course gravel	33–64	0	0	2	0	0	4	0	3	1.13
Small cobble	65–90	0	0	1	0	0	0	0	1	0.25
Medium cobble	91–128	0	0	1	0	0	2	0	0	0.38
Large cobble	129–256	0	0	0	0	0	0	0	1	0.13
Small boulder	257–512	0	0	0	0	0	0	0	0	0.00
Medium boulder	513–1,024	0	0	0	0	0	0	0	0	0.00
Large boulder	> 1,025	0	0	0	0	0	0	0	0	0.00

Table 7. Out-of-channel particle size distribution

Particle Class	Size Range (mm)	Count								
		Sub-reach 2	Sub-reach 3	Sub-reach 4	Sub-reach 5	Sub-reach 6-1	Sub-reach 6-2	Sub-reach 7	Sub-reach 8	Full Reach
Fines	< 0.5	28	29	34	25	16	9	10	30	181
Sand	0.5–2	18	19	6	8	9	11	15	4	90
Very fine gravel	2–4	4	1	6	7	12	14	14	8	66
Fine gravel	5–8	0	0	2	4	9	7	7	4	33
Medium gravel	9–16	0	1	1	6	2	6	2	3	21
Course gravel	17–32	0	0	1	0	2	2	1	1	7
Very course gravel	33–64	0	0	0	0	0	1	0	0	1
Small cobble	65–90	0	0	0	0	0	0	1	0	1
Medium cobble	91–128	0	0	0	0	0	0	0	0	0
Large cobble	129–256	0	0	0	0	0	0	0	0	0
Small boulder	257–512	0	0	0	0	0	0	0	0	0
Medium boulder	513–1,024	0	0	0	0	0	0	0	0	0
Large boulder	> 1,025	0	0	0	0	0	0	0	0	0

Particle Class	Size Range (mm)	Percent								
		Sub-reach 2	Sub-reach 3	Sub-reach 4	Sub-reach 5	Sub-reach 6-1	Sub-reach 6-2	Sub-reach 7	Sub-reach 8	Full Reach
Fines	< 0.5	56	58	68	50	32	18	20	60	45.25
Sand	0.5–2	36	38	12	16	18	22	30	8	22.5
Very fine gravel	2–4	8	2	12	14	24	28	28	16	16.5
Fine gravel	5–8	0	0	4	8	18	14	14	8	8.25
Medium gravel	9–16	0	2	2	12	4	12	4	6	5.25
Course gravel	17–32	0	0	2	0	4	4	2	2	1.75
Very course gravel	33–64	0	0	0	0	0	2	0	0	0.25
Small cobble	65–90	0	0	0	0	0	0	2	0	0.25
Medium cobble	91–128	0	0	0	0	0	0	0	0	0
Large cobble	129–256	0	0	0	0	0	0	0	0	0
Small boulder	257–512	0	0	0	0	0	0	0	0	0
Medium boulder	513–1,024	0	0	0	0	0	0	0	0	0
Large boulder	> 1,025	0	0	0	0	0	0	0	0	0

Table 8. Summary of Hydrology Protocol Level 1 indicator scores for all sub-reaches

Level 1 Indicator	Sub-reach 2	Sub-reach 3	Sub-reach 4	Sub-reach 5	Sub-reach 6	Sub-reach 7	Sub-reach 8	Average
1.1 Water in channel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.2 Fish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.3 Benthic macroinvertebrates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.4 Filamentous algae/periphyton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.5 Differences in vegetation	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
1.6 Absence of rooted upland plants	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
1.7 Sinuosity	1.0	1.5	2.0	1.0	1.0	1.0	1.0	**1.2**
1.8 Floodplain and channel dimensions	1.5	1.0	1.5	1.0	0.0	3.0	1.0	**1.3**
1.9 In-channel structure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.10 Particle size and sorting	0.0	0.0	1.5	1.0	0.0	0.0	1.5	**0.6**
1.11 Hydric soils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.12 Sediment on plants and debris	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
1.13 Seeps and springs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.14 Iron-oxidizing bacteria/fungi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total[1]	**5.5**	**5.5**	**8.0**	**6.0**	**4.0**	**7.0**	**6.5**	**6.1**

[1] A total score of less than 9 is considered to be an indicator of ephemeral conditions. A total score between 9 and 12 is considered borderline. A total score of 12 or greater is considered to be an indicator of intermittent conditions.

Figures

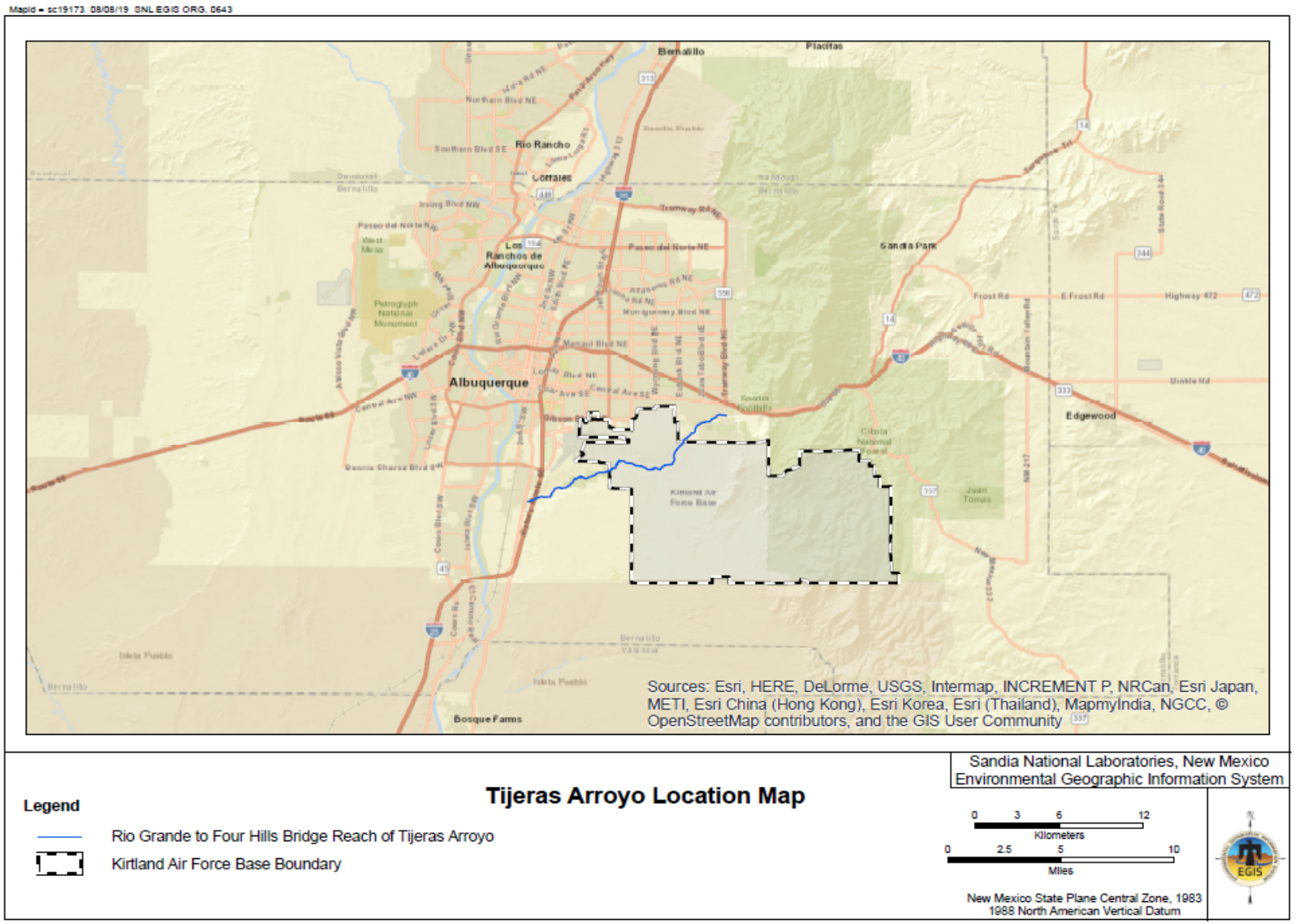


Figure 1. Tijeras Arroyo location map

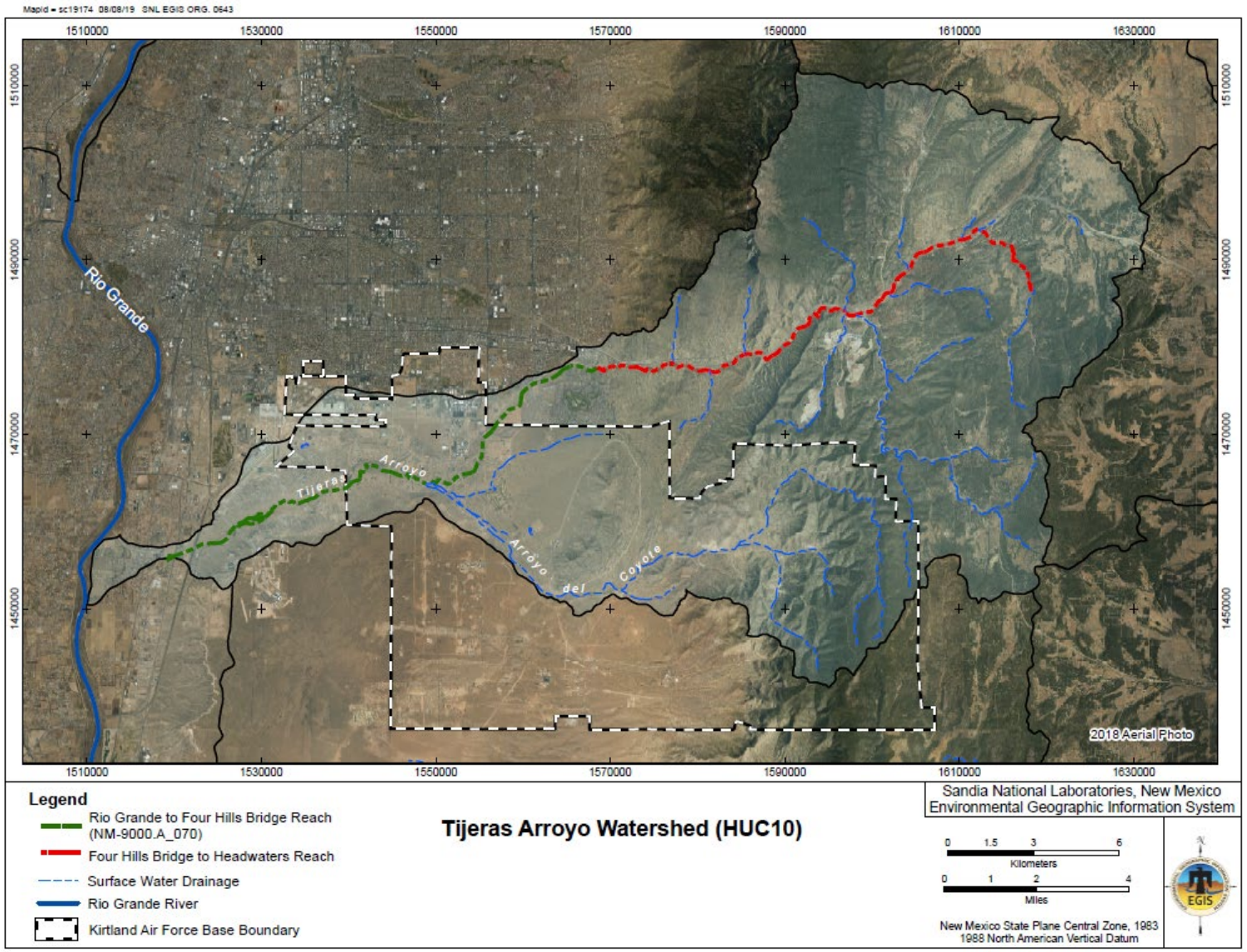


Figure 2. Tijeras Arroyo Watershed (HUC10)

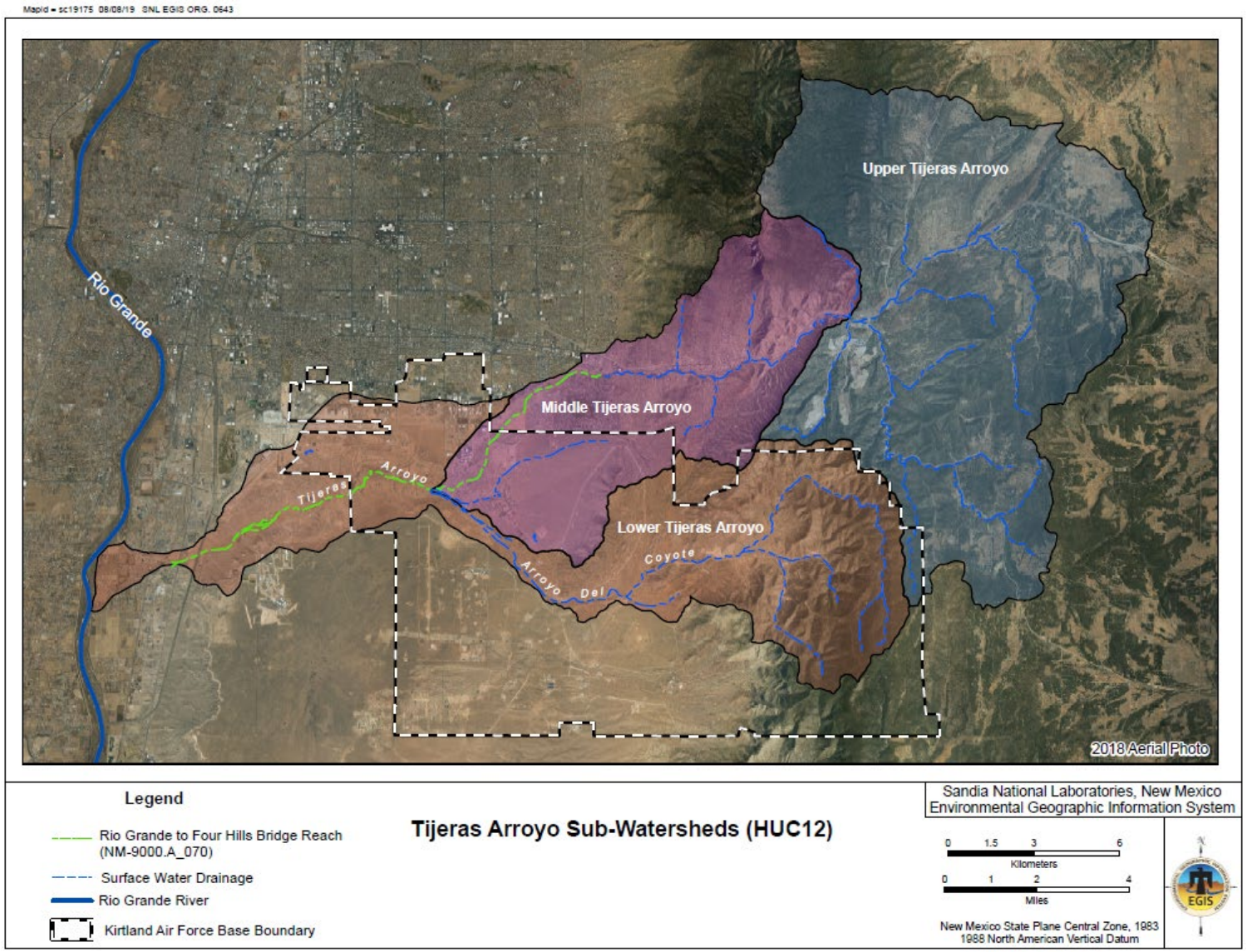


Figure 3. Tijeras Arroyo sub-watersheds (HUC12)

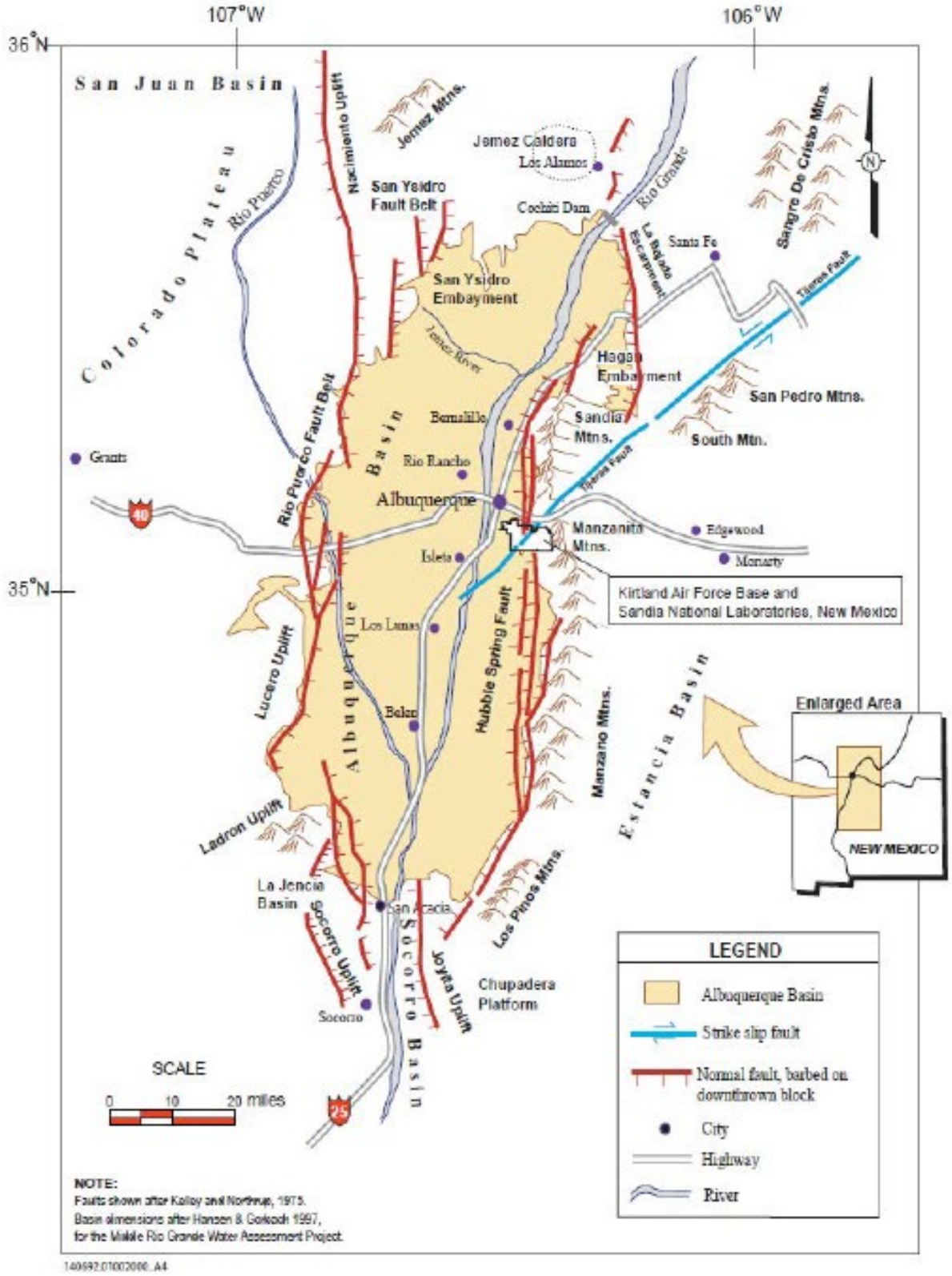


Figure 4. Regional geological setting

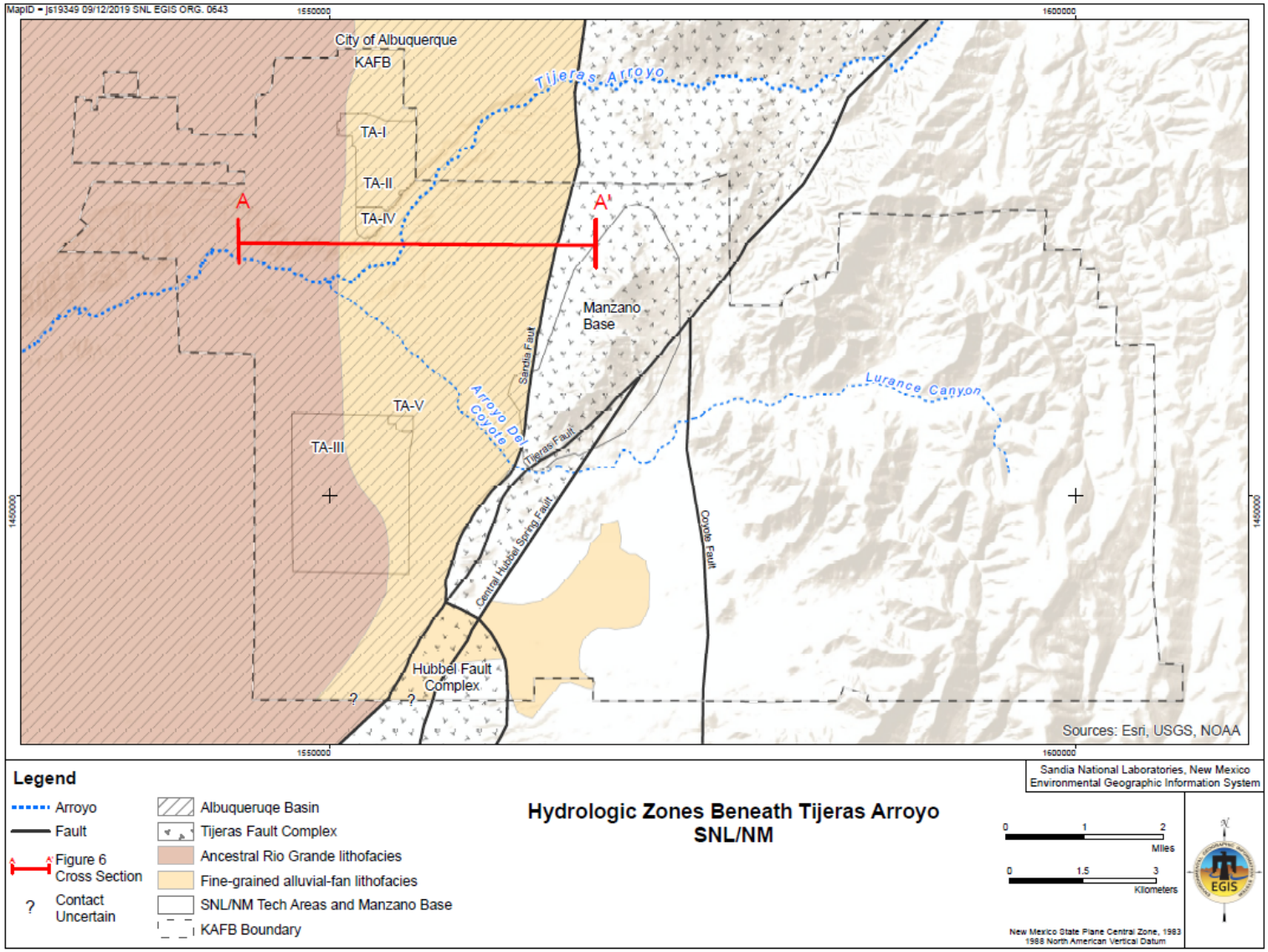


Figure 5. Hydrologic zones beneath Tijeras Arroyo at SNL/NM

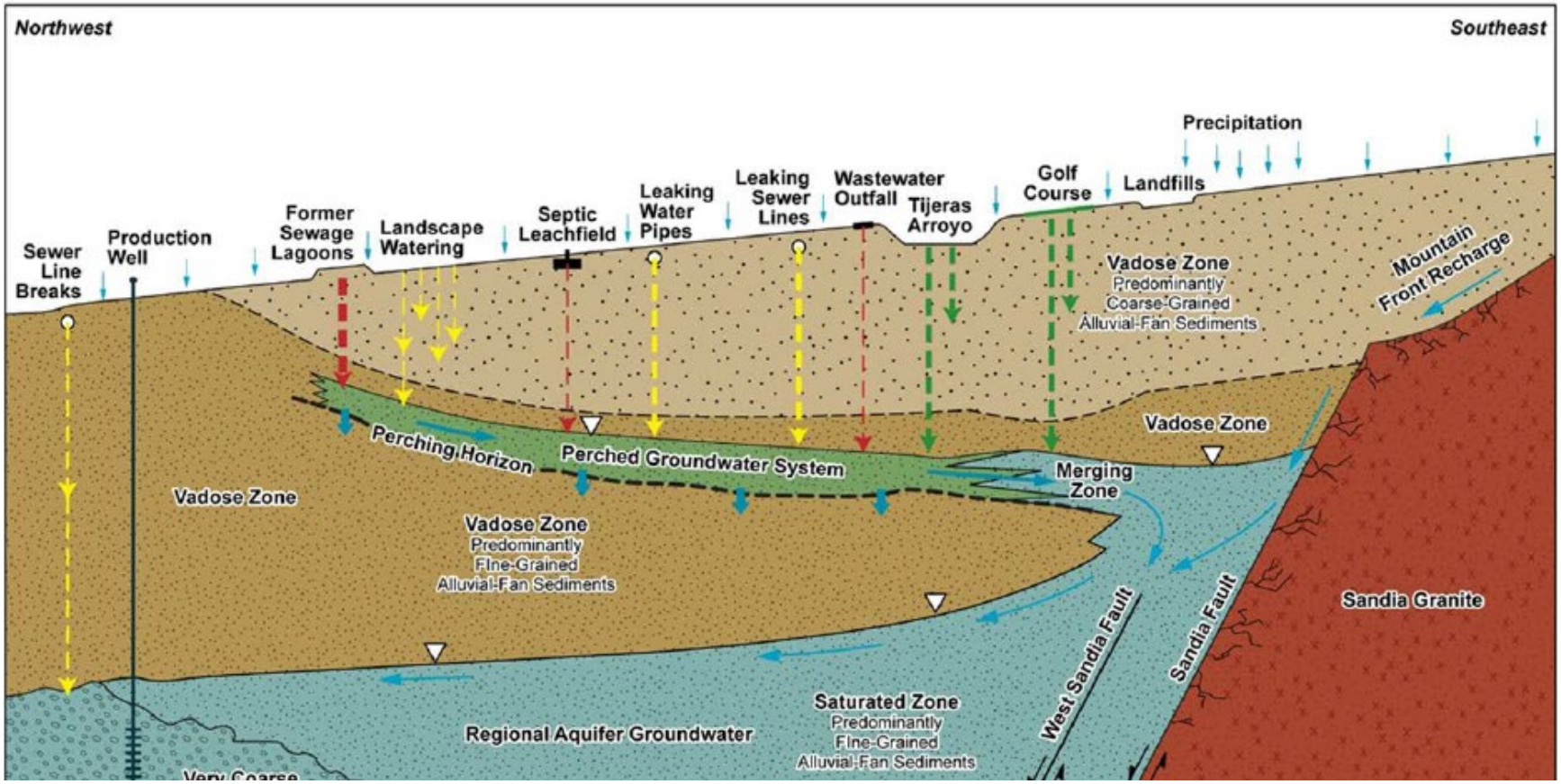


Figure 6. Cross section showing perched and regional groundwater zones beneath Tijeras Arroyo

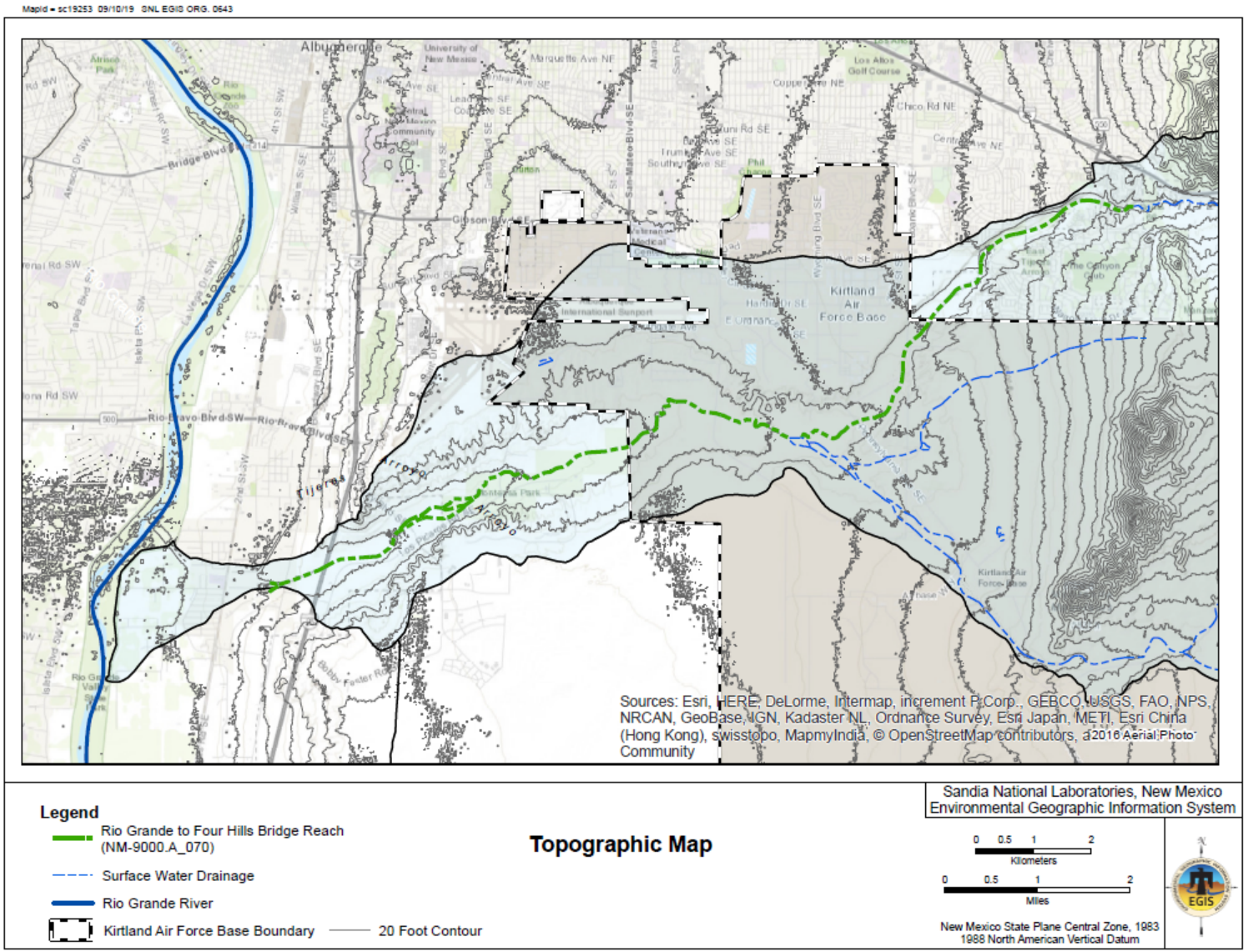


Figure 7. Tijeras Arroyo topographic map

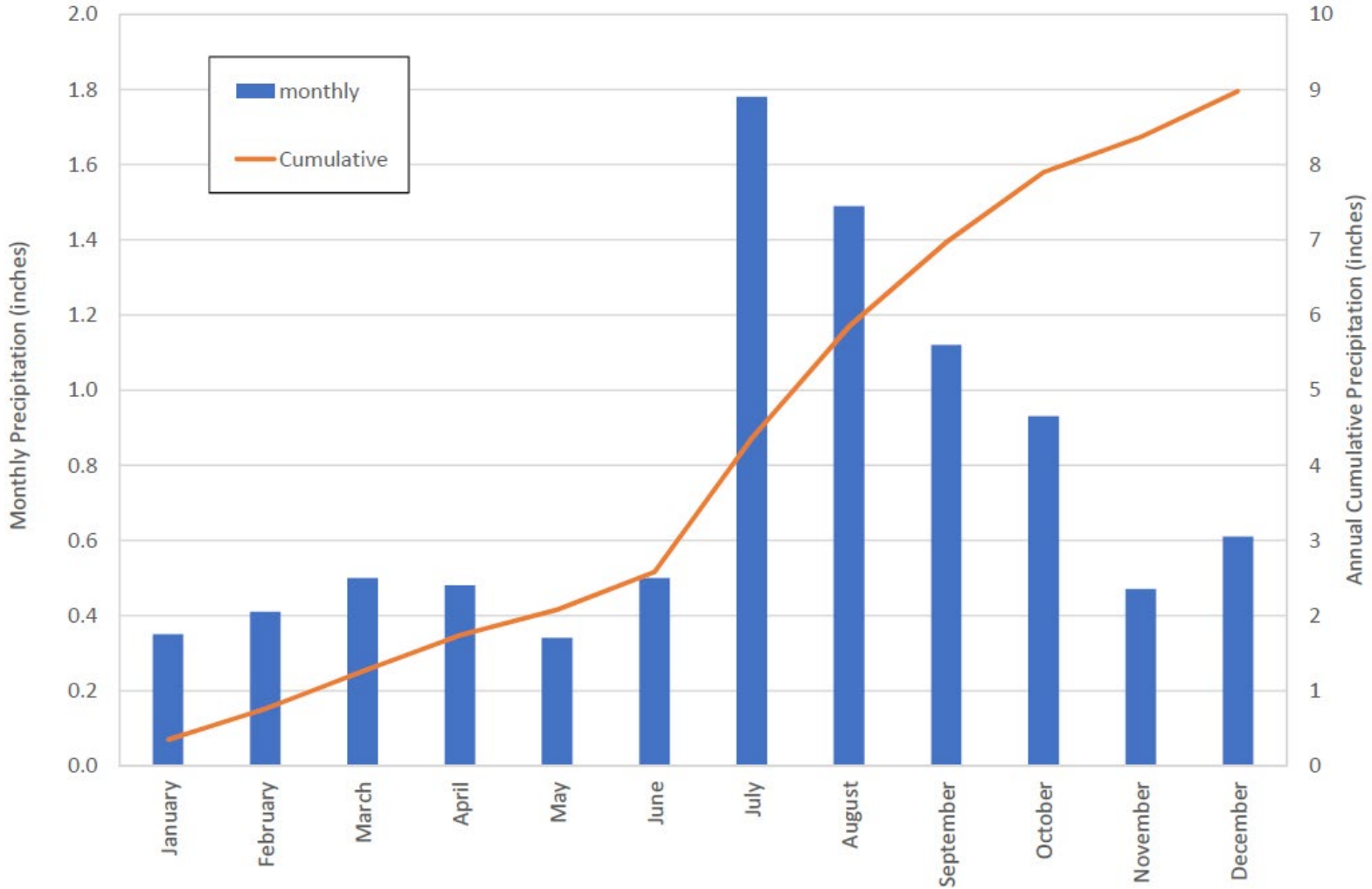


Figure 8. Average precipitation at SNL/NM meteorological Tower A21 (1994–2018)

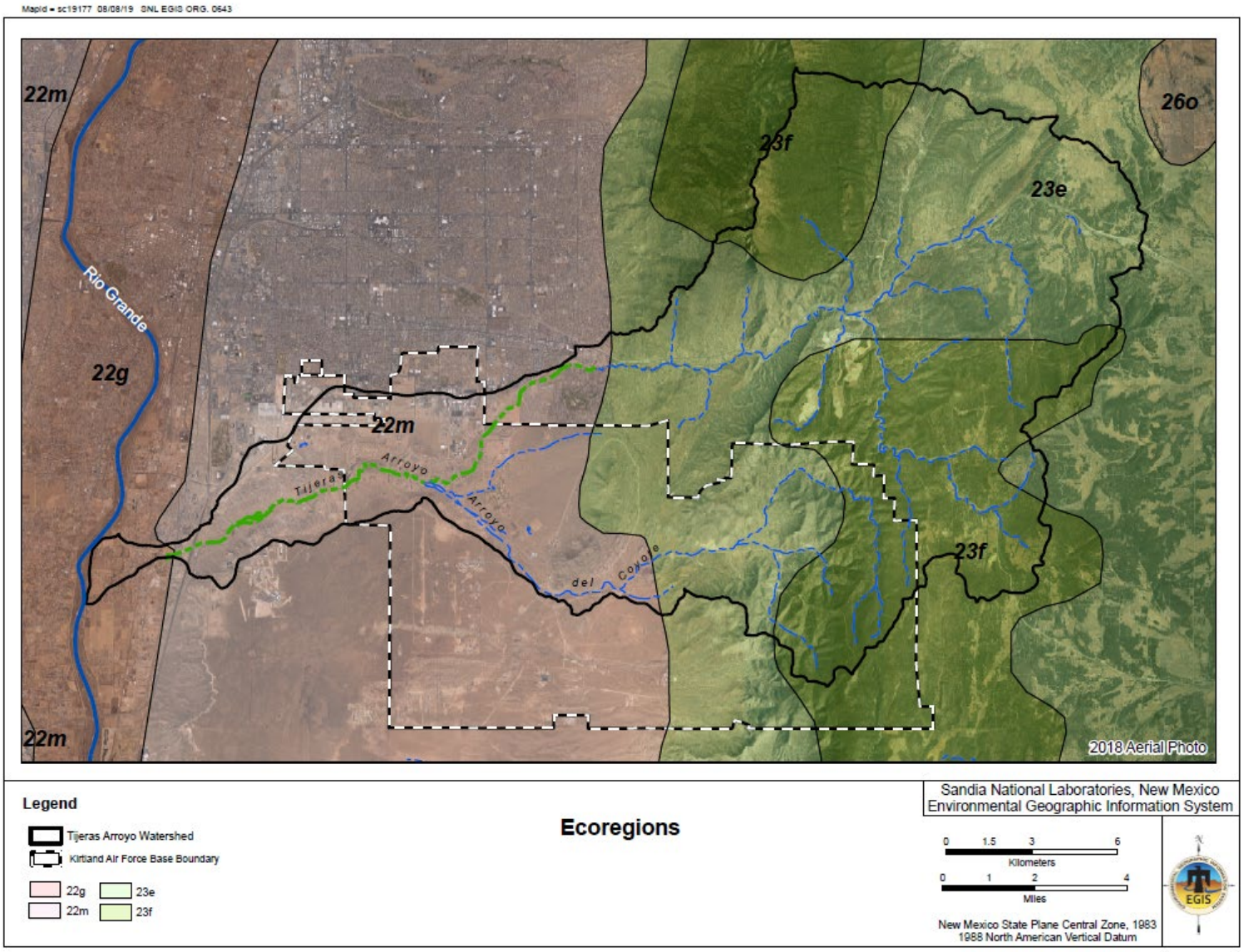


Figure 9. Ecoregions

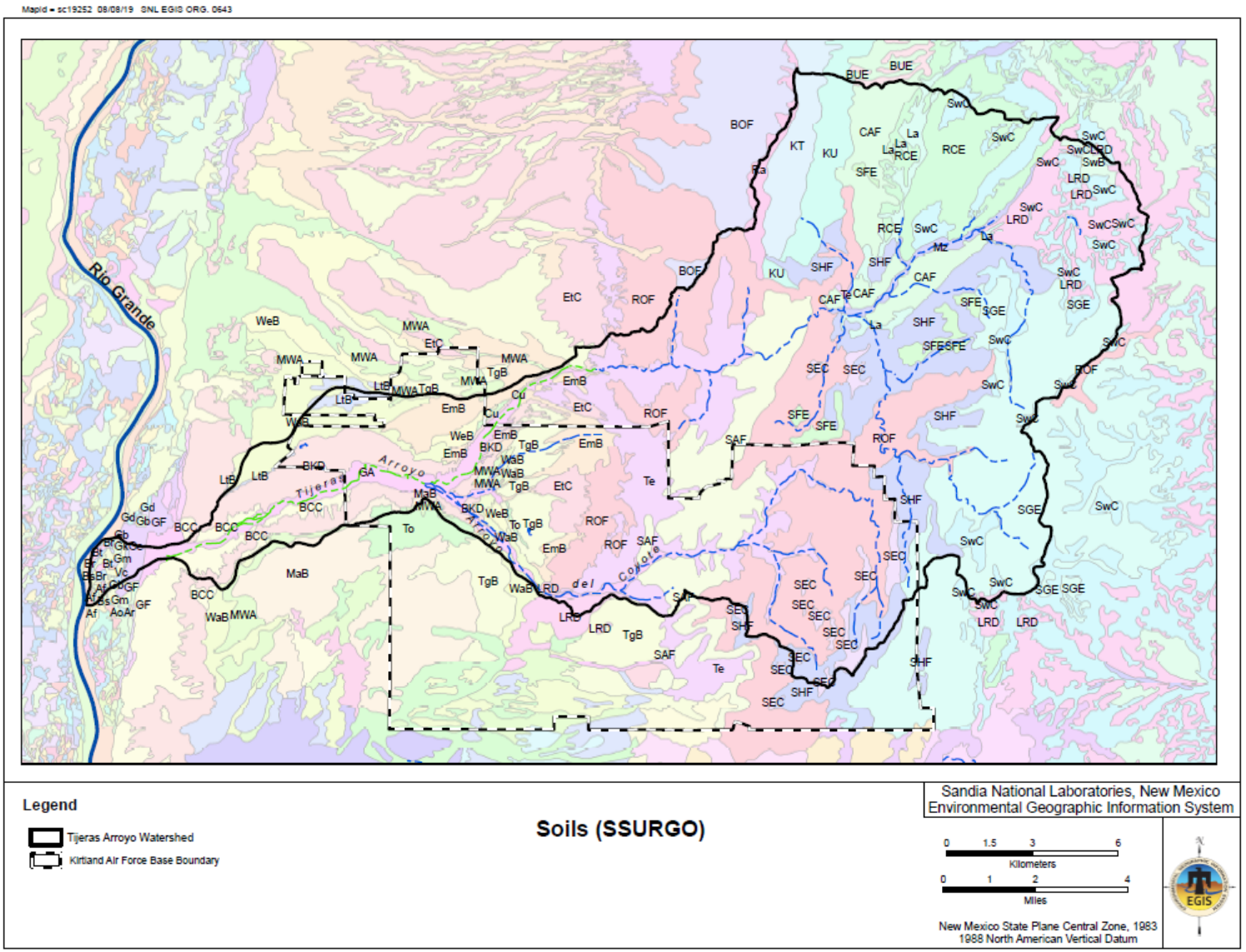


Figure 10. Soils (Natural Resources Conservation Service Soil Survey Geographic Database)

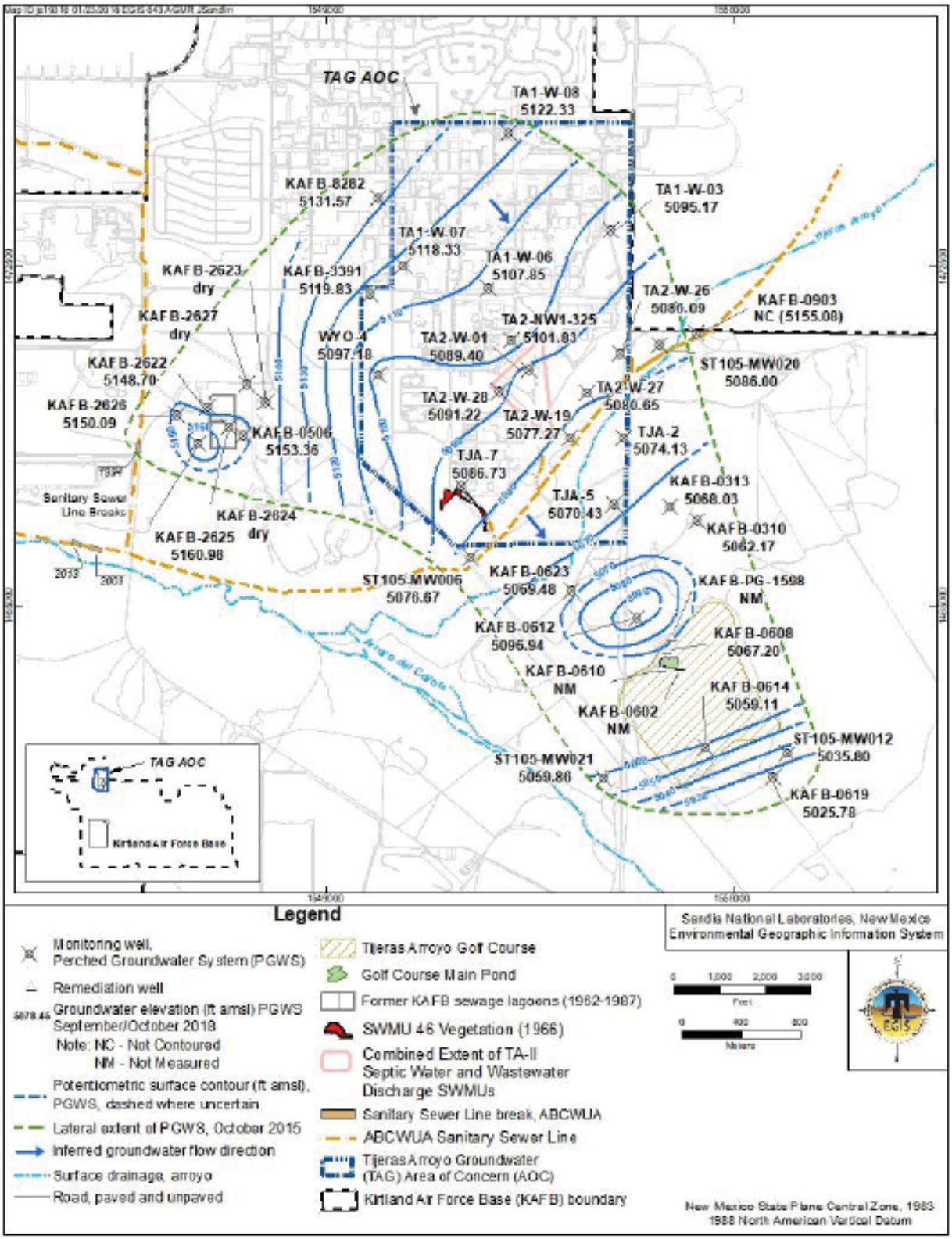


Figure 11. Potentiometric surface map for the perched groundwater system near sub-reaches 5 and 6 (September and October 2018)

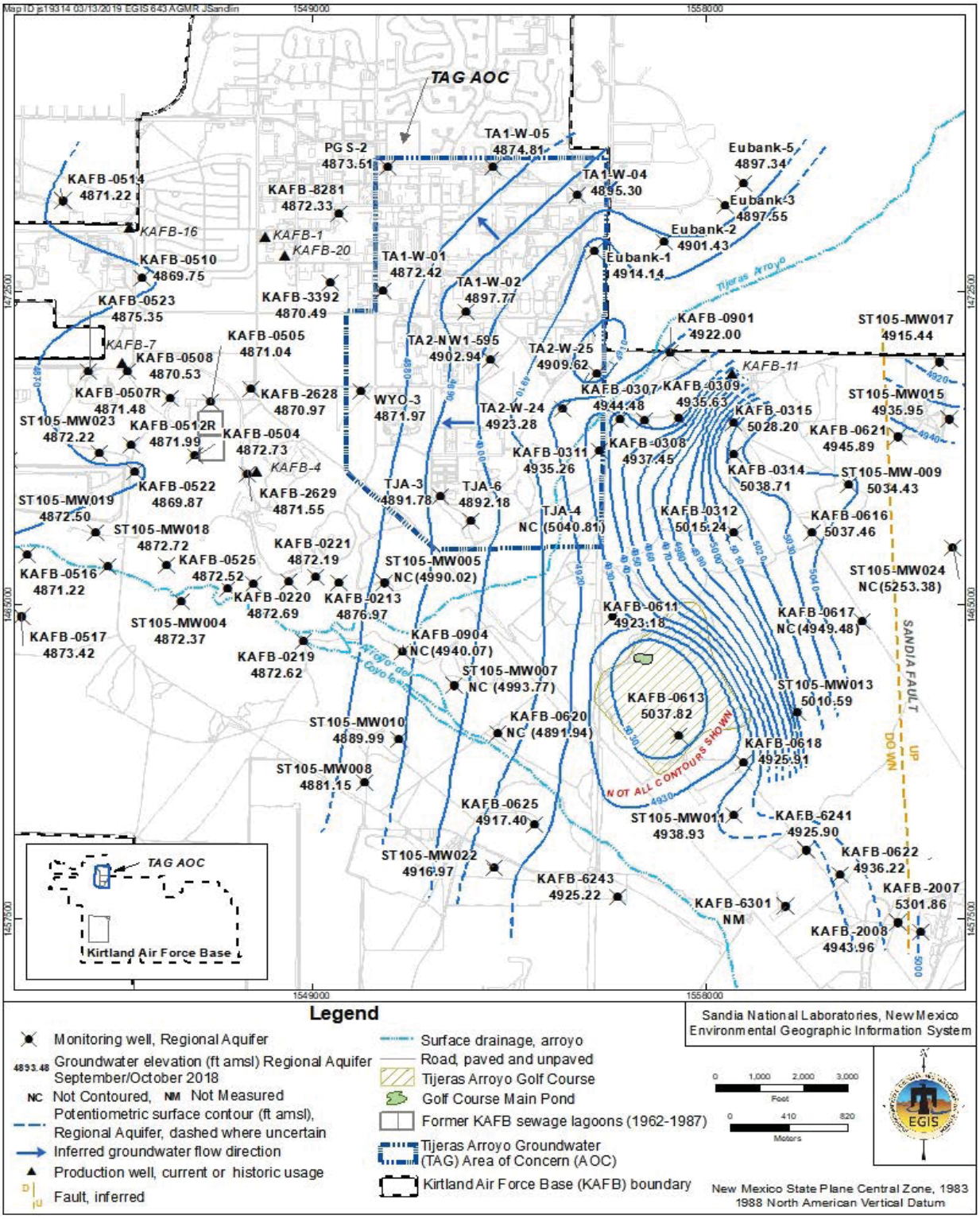


Figure 12. Potentiometric surface map for the regional groundwater system near sub-reaches 5 and 6 (September and October 2018)

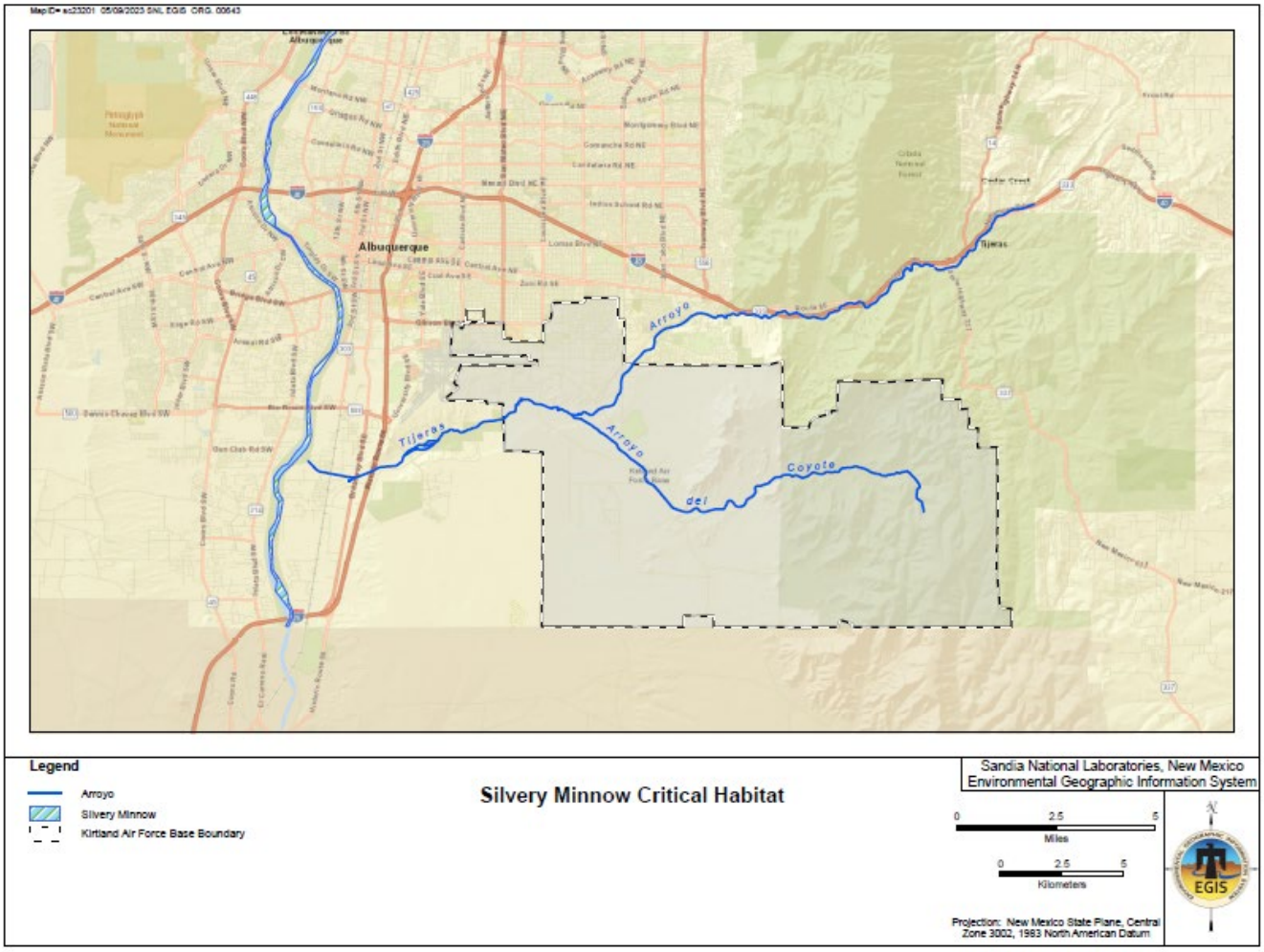


Figure 13. Location of critical habitat for threatened or endangered species

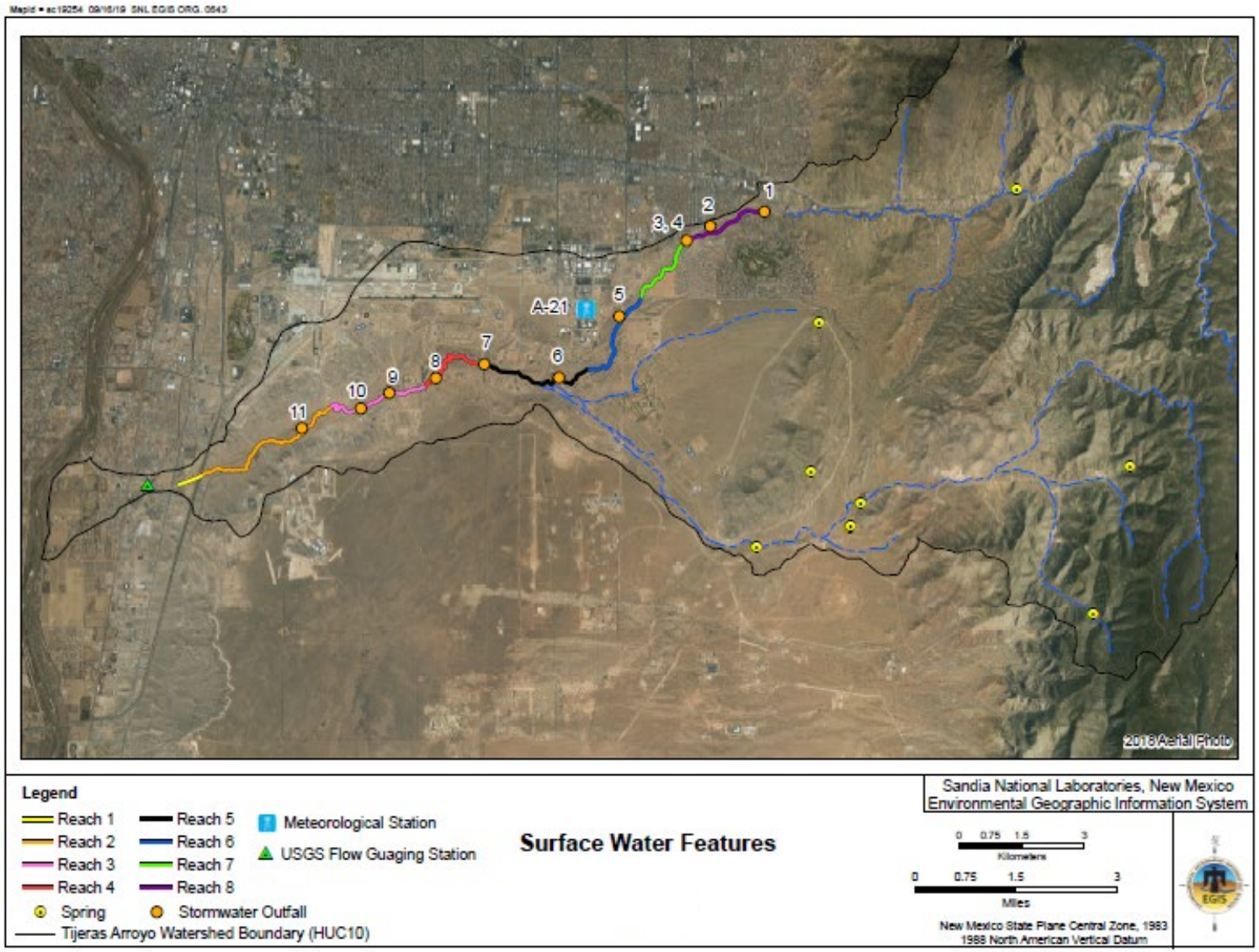


Figure 14. Surface water features

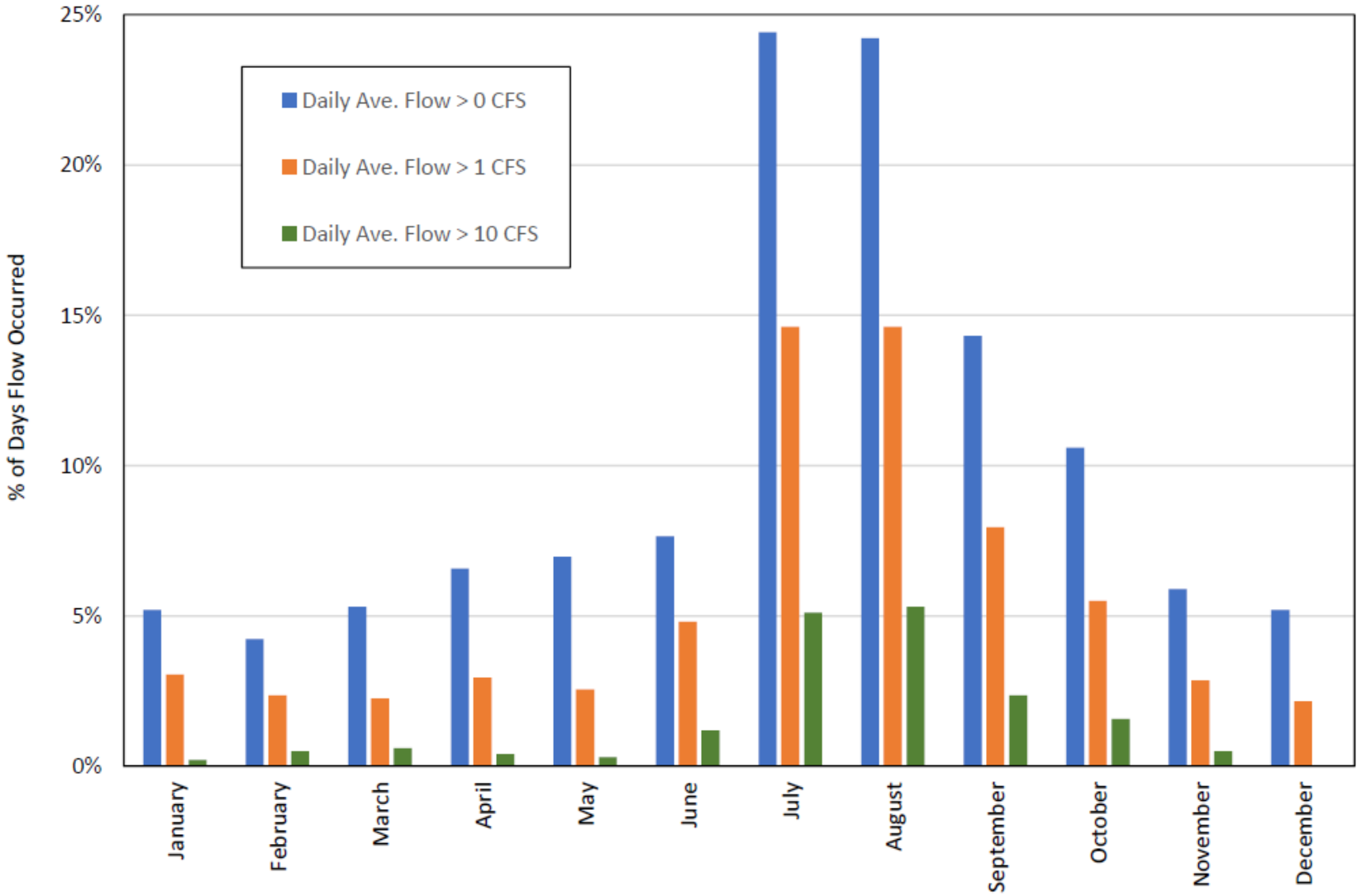


Figure 15. Monthly flow frequency in Tijeras Arroyo at USGS gage (1984–2018)

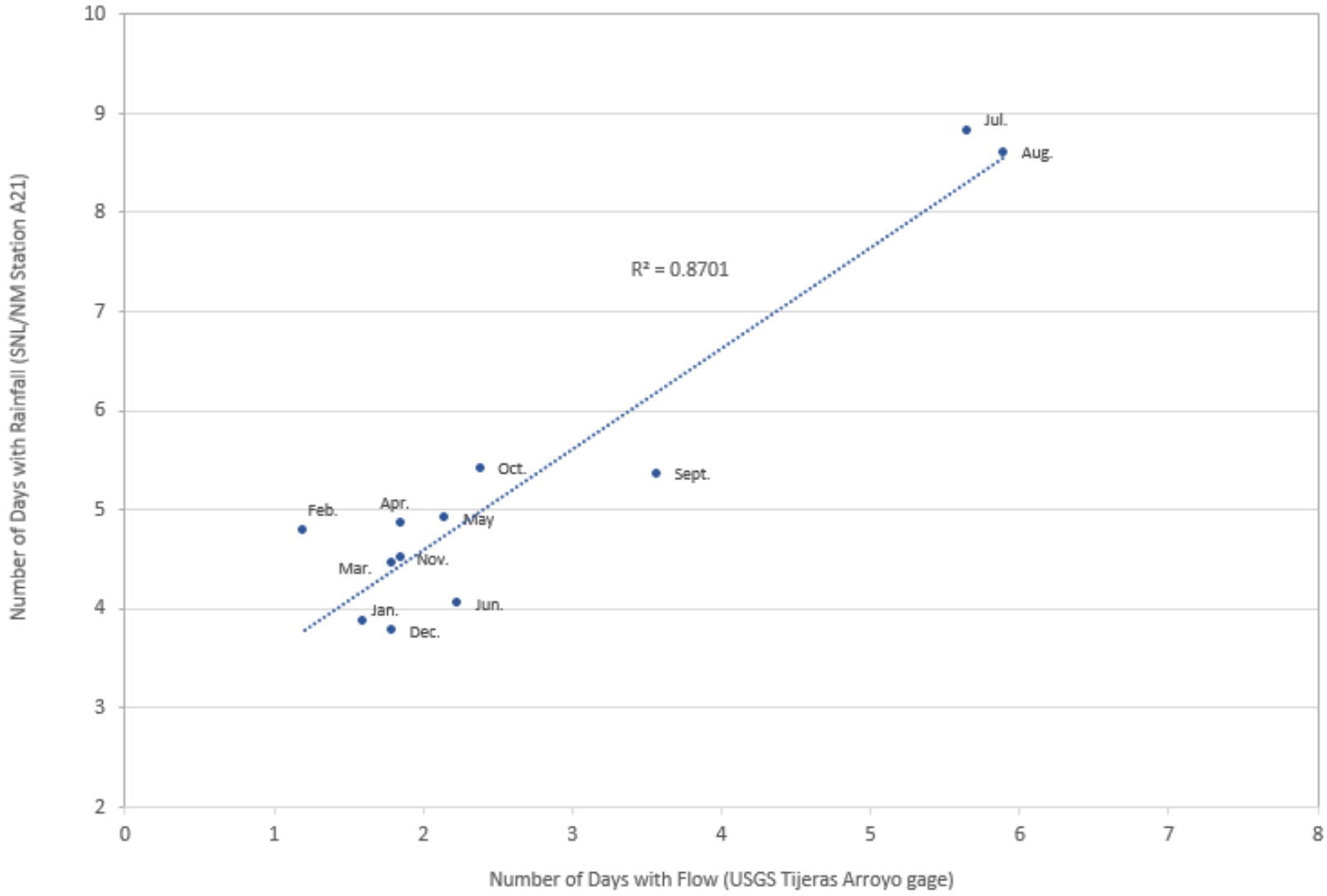


Figure 16. Average monthly days with rainfall versus average monthly days with flow

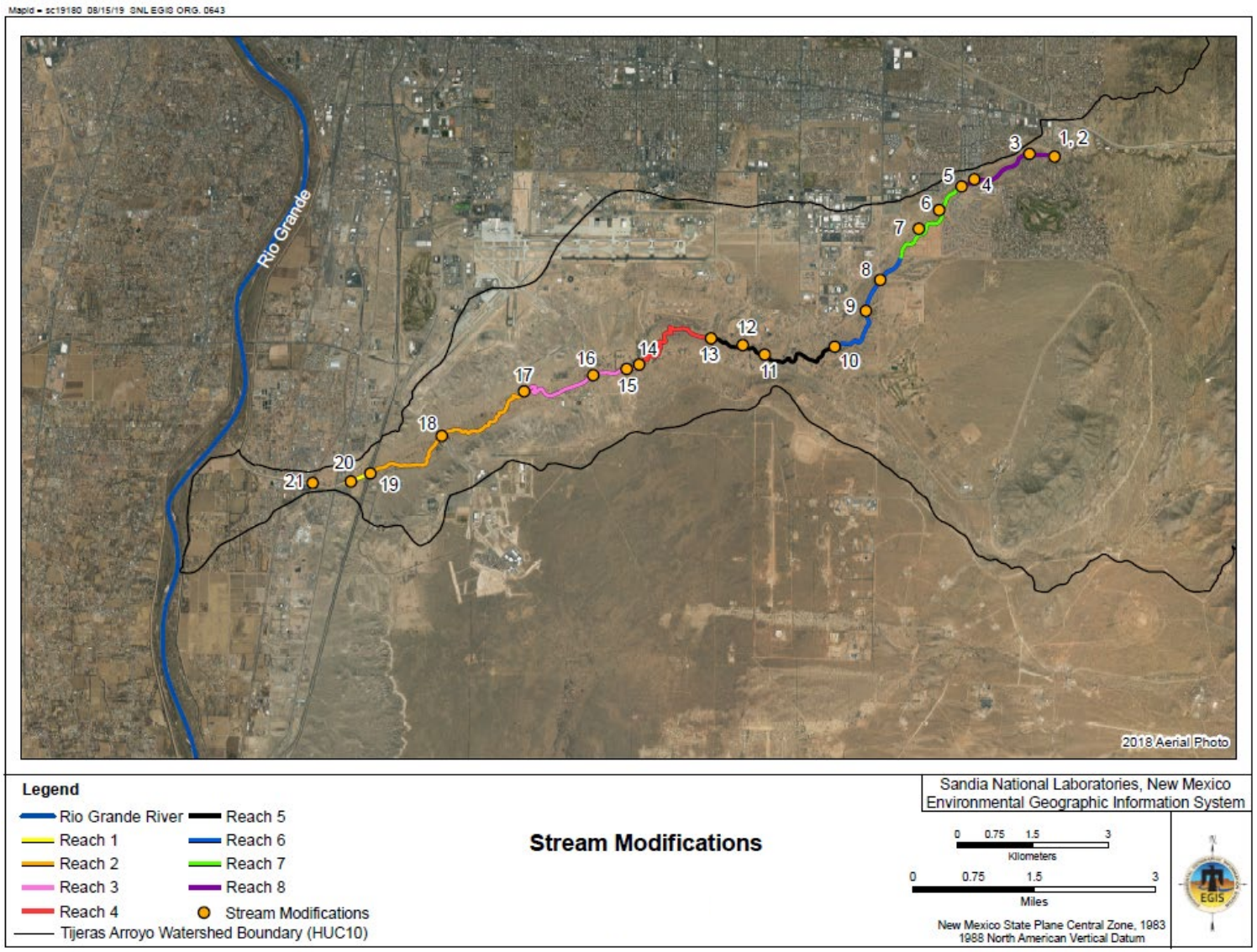


Figure 17. Stream modifications

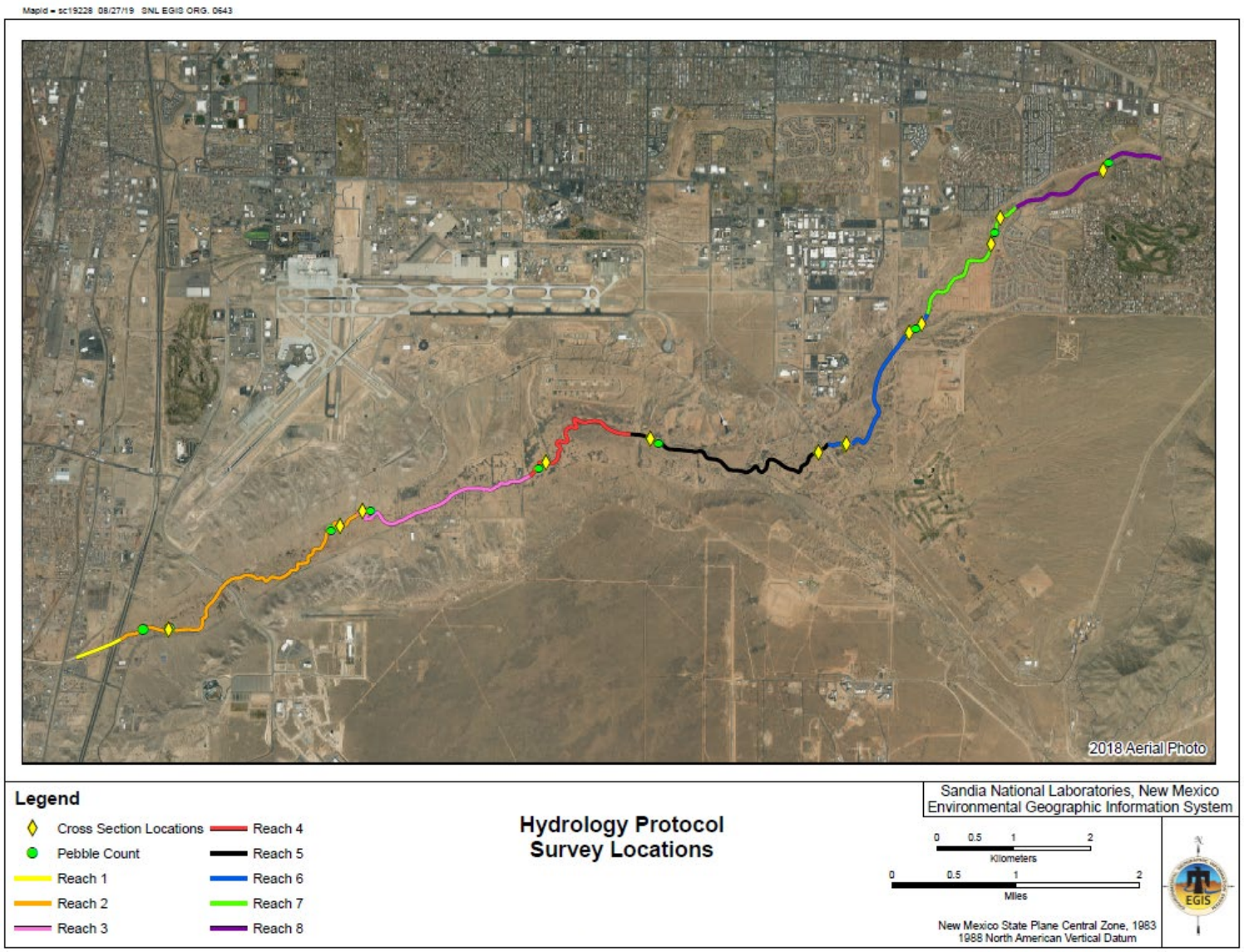


Figure 18. Hydrology Protocol survey locations

References

19.26.2 NMAC. (New Mexico Administrative Code). 2005. *Natural Resources and Wildlife, Surface Water Administration*. Santa Fe, NM: NMAC.

20.6.4 NMAC. 2016. *Water Quality Standards for Interstate and Intrastate Surface Waters.* Santa Fe, NM: NMAC New Mexico Water Quality Control Commission.

40 CFR 131.10, *Water Quality Standards*. 2009. Washington, D.C.: U.S. Government Printing Office.

Griffith, G. E., J. M. Omernik, M. M. McGraw, G. Z. Jacobi, C. M. Canavan, T. S. Schrader, D. Mercer, R. Hill, and B. C. Moran. 2006. "Ecoregions of New Mexico" (color poster with map, descriptive text, summary tables, and photographs; map scale 1:1,400,000). Reston, VA: U.S. Geological Survey.

NMED (New Mexico Environment Department). 2011a. *Hydrology Protocol for the Determination of Ephemeral, Intermittent, and Perennial Waters*. Santa Fe, NM: NMED Surface Water Quality Bureau.

———. 2022. *2020-2022 State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report*, Appendix A, "Integrated List Spreadsheet." Santa Fe, NM: NMED.

SNL/NM (Sandia National Laboratories, New Mexico). *SNL/NM Site-Wide Hydrogeologic Characterization Project.* 1994. Albuquerque, NM: SNL/NM.

———. 1998. *Revised Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report, Revised February 1998*. Albuquerque, NM: SNL/NM.

———. 2020. *2020 Annual Site Environmental Report for Sandia National Laboratories, New Mexico.* Albuquerque, NM: SNL/NM.

———. 2019. *Annual Groundwater Monitoring Report, Calendar Year 2018*. Albuquerque, NM: SNL/NM.

USACE (U.S. Army Corps of Engineers). 1979. *Special Flood Hazard Information, Tijeras Arroyo and Arroyo del Coyote, Kirtland AFB, New Mexico.* Albuquerque, NM: USACE Albuquerque District.

USDA (U.S. Department of Agriculture). 1977. *Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico*. Washington, D.C.: USDA Soil Conservation Service.

NTESS Exhibit 4

WORK PLAN

USE ATTAINABILITY ANALYSIS FOR TIJERAS ARROYO; RIO GRANDE TO FOUR HILLS BRIDGE REACH (ASSESSMENT UNIT ID NM-9000.A_070)

Sandia National Laboratories

U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
Albuquerque, NM

May 5, 2017





Sandia National Laboratories is a multi-program laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.



Table of Contents

1. Introduction 3
2. Background 3
    2.1 Water Quality Standards, Beneficial Uses, and Stream Classifications 4
    2.2 Use Attainability Assessment 5
    2.3 Hydrology Protocol 6
3. Scope of Work 6
    3.1 Project Personnel 7
    3.2 Compilation of Existing Data 7
    3.3 Collection of New Data 8
4. Provisions for Public Notice and Consultation with Government Agencies 10
5. Reporting 11

1. Introduction

This work plan was prepared by National Technology and Engineering Solutions of Sandia (NTESS) and the U. S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Sandia Field Office (SFO) to conduct a Use Attainability Analysis (UAA) for a portion of the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM-9000.A_070). This reach of the Tijeras Arroyo receives stormwater discharged from Sandia National Laboratories, New Mexico (SNL/NM).

A UAA is an assessment of stream conditions required by the U.S. Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) to change the designated flow regime (perennial, intermittent, or ephemeral) of a Water of the United States (WOTUS) or a Water of the State of New Mexico. A UAA involves the compilation of hydrological, geomorphic, and biological stream characteristics data through GIS mapping, review of existing information, completion of field surveys, and the preparation of a report describing which flow regime designation is supported by the findings. Results are compiled in a report and submitted to NMED and ultimately to EPA for review and approval.

This work plan describes data and methods that will be used to prepare the UAA. In accordance with the guidelines provided in 20.6.2.4 NMAC, this work plan describes existing information that will be used for the UAA, new data that will be generated during the UAA, factors affecting use attainment that will be analyzed, and provisions for public notice and consultation with government agencies.

This work is being conducted in support of regulatory compliance activities required by National Pollution Discharge Elimination System (NPDES) stormwater permits, specifically, the Multi-Sector General Permit (MSGP) and the Municipal Separate Storm Sewer System (MS4) Permit.

2. Background

The headwaters of the Tijeras Arroyo are located in Tijeras Canyon and the foothills of the Sandia and Manzano Mountains east of Kirtland Airforce Base (KAFB). The Tijeras Arroyo flows from east to west and terminates where it discharges to the Rio Grande. The total length of the Tijeras Arroyo is approximately 27.5 miles. For regulatory purposes, NMED divides the Tijeras into two separate assessment units (AUs); Rio Grande to Four Hills Bridge (AU ID NM-9000.A_070) and Four Hills Bridge to Headwater (AU NM-9000.A_001).

SNL/NM discharges stormwater to the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; NM-9000.A_070) within the boundaries of Kirtland Air Force Base (KAFB). The 2016-2018 State of New Mexico Clean Water Act Section 303(d) Integrated Report[1] (303(d) List) identifies the "Water Type" for this reach as ephemeral, but specifies beneficial uses (and therefore water quality standards) for intermittent waters. A comment for this AU in the 2016-2018 State of New Mexico Clean Water Act 303(d) Integrated List states:

[1] State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report, Appendix A – Integrated List, page 203 (2016).

> *Application of the [Surface Water Quality Bureau] SWQB Hydrology Protocol (survey date 6/24/09) indicate [SIC] this assessment unit is ephemeral (Hydrology Protocol score of 3.0 with 89.1% days with no flow at USGS gage 08330600 – see http://www.nmenv.state.nm.us/swqb/Hydrology for additional details on the protocol). NMED must complete the process detailed in 20.6.4.15 NMAC Subsection C in order to a [SIC] waterbody under 20.6.4.97 NMAC. Until such time, this waterbody will remain under 20.6.4.98 NMAC.*

The "process detailed in 20.6.4.15 NMAC Subsection C" is the UAA. NTESS and SFO propose completing the UAA in order to resolve this discrepancy and to establish consistent and appropriate regulation of stormwater discharges from SNL/NM.

2.1 Water Quality Standards, Beneficial Uses, and Stream Classifications

In New Mexico, water quality standards (WQS) are based upon the beneficial uses of a water body. Beneficial uses are assigned by NMED (and approved by EPA) with consideration to the flow regime of the water body (perennial, intermittent, or ephemeral); therefore, WQS are largely a function of whether the water body is perennial, intermittent, or ephemeral.

Intermittent waters have more stringent WQS than ephemeral waters. This is due to the types of aquatic life intermittent waters support, as well as their recreational and economic uses. The terms intermittent and ephemeral are defined as follows in 20.6.4.7 NMAC:

Intermittent: *when used to describe a surface water of the state means the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow.*

Ephemeral: *when used to describe a surface water of the state means the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region.*

The uses designated for intermittent water bodies and their definitions (20.6.4.97 NMAC) are:

- *livestock watering* (use of a surface water for consumption by livestock),
- *wildlife habitat* (surface water used by plants or animals not considered as pathogens, or vectors for pathogens, or intermediate hosts for pathogens for humans or domesticated livestock and plants),
- *marginal warmwater aquatic life* (natural severely limit the ability of the surface water to sustain a natural aquatic life population on a continuous basis), and
- *primary contact* (any recreational or other water use in which there is prolonged or intimate human contact with water, such as swimming and water skiing, involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, or any use of the surface water for cultural, religious, or ceremonial purposes in which there is intimate human contact with the water).

The uses designated for ephemeral water bodies (20.6.4.98 NMAC) are:

- *livestock watering* (use of a surface water for consumption by livestock),
- *wildlife habitat* (surface water used by plants or animals not considered as pathogens, or vectors for pathogens, or intermediate hosts for pathogens for humans or domesticated livestock and plants),
- *limited aquatic life* (the surface water is capable of supporting only a limited community of aquatic life), and
- *secondary contact* (a water in which recreational contact may occur, and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, boating, and limited seasonal contact).

In New Mexico, non-perennial waters (intermittent and ephemeral) are regulated by default under 20.6.4.98 NMAC, unless a UAA has been conducted and indicates a specific water should be classified under 20.6.4.97. In other words, NMED presumes that all waters can support the uses listed under 20.6.4.98 unless a UAA demonstrates otherwise.

2.2 Use Attainability Assessment

A UAA is a scientific study conducted for the purpose of assessing if a given water body supports a particular beneficial use. A UAA must be conducted before a designated use can be removed or changed to a category requiring less stringent criteria, and it must demonstrate that attainment of the use is not feasible based on at least one of the factors identified in federal regulation at 40 CFR 131.10(g):

1) *Naturally occurring pollutant concentrations prevent the attainment of the use;*
2) *Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met;*
3) *Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;*
4) *Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use;*
5) *Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses;*
6) *Controls more stringent than those required by sections 301(b) and 306 [technology-based effluent limitations] of the Act would result in substantial and widespread economic and social impact.*

Of particular relevance to the Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo are factors 2 and 5, which will likely be the factors that determine if the water is intermittent or ephemeral. Flow in Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM 9000.A_070) occurs infrequently and only in direct response to precipitation events. For this

reason, our analysis will focus largely on the occurrence of water and flow and how it limits the reach's ability to support "marginal warmwater aquatic life" and "primary contact" beneficial uses. The scoring system provided by the Hydrology Protocol will be used to quantify if the reach is intermittent or ephemeral, but supporting information and analysis will be provided.

2.3 Hydrology Protocol

NMED allows for an expedited UAA process for certain ephemeral waters; this process will be utilized under this work plan. The expedited UAA process focuses on evaluating the aquatic life and contact uses, and is based on a field survey method developed by NMED called the *Hydrology Protocol* (HP). The HP is described in detail in *Hydrology Protocol for the Determination of Uses Supported by Ephemeral, Intermittent, and Perennial Waters,* and in Section II.C of *New Mexico's Water Quality Management Plan and Continuing Planning Process*. A brief summary is provided below.

The HP is guided by field survey sheets containing specific questions that evaluate the hydrological, geomorphic and biological indicators of the persistence of water. A scoring system enables the user to evaluate which aquatic life and contact uses are supported by the water body, and therefore, if the water is intermittent or perennial. The HP is organized into a Level 1 and Level 2 evaluation. Data gathered during the Level 1 evaluation are usually adequate to indicate the hydrological status of the stream. If the Level 1 evaluation is inconclusive, a Level 2 evaluation may be conducted.

Results of the HP are incorporated into the UAA as described in Subsection C of 20.6.4.15 NMAC. In addition to the HP, the UAA will present existing information regarding the hydrology, climate, geography, land use, wildlife, vegetation, and any other pertinent information.

After the UAA is compiled, it is submitted to NMED for review. If NMED agrees with the findings of the UAA, it posts the UAA on its website and notifies interested parties of a 30-day public comment period. NMED then submits the UAA, with any revisions and responses to comments, to EPA Region 6 for technical approval. If EPA grants technical approval, Tijeras Arroyo (Rio Grande to Four Hills Bridge reach) will be subject to the WQS in 20.6.4.97 NMAC (for ephemeral waters) for implementation under the CWA. The NMED then petitions the NM Water Quality Control Commission (WQCC) to specifically itemize Tijeras Arroyo (Rio Grande to Four Hills Bridge reach) by name in Subsection C of 20.6.4.97 NMAC.

3. Scope of Work

This scope of work is guided by requirements listed in Subsection C of 20.6.4.15 NMAC and the NMED document *Hydrology Protocol for the Determination of Uses Supported by Ephemeral, Intermittent, and Perennial Waters.* NTSS and SFO will rely on both existing data as well as newly generated data to compile the UAA.

The study area will include the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM-9000.A_070) and the surrounding area having the potential to impact flows within the reach. The HUC 10 watershed boundary (Tijeras Arroyo) that encompasses this area is shown

in Figure 1. The HUC 12 watershed boundaries (Upper Tijeras Arroyo, Middle Tijeras Arroyo, and Lower Tijeras Arroyo) that contribute flow to this reach are shown in Figure 2.

3.1 Project Personnel

A multidisciplinary staff of environmental professionals including, geologists, hydrologists, water quality specialists, biologists, ecologists, meteorologists, geographers, GIS analysts, and field technicians will be utilized to compile the UAA.

The project team for this work will he led by the Stormwater Program. The primary team members are listed in Table 1 below, however, additional expertise will be leveraged as needed.

Table 1: Primary UAA team members.

Team Member	SNL/NM Program	Primary UAA Role
John Kay	Stormwater	Project Lead/geology
Kathie Deal	Stormwater	Program Lead/Regulatory review
Carolyn Daniel	Stormwater	Flow and water quality
Jamie Gomez	Stormwater	Sediment/soil
Regina Deola	Meteorology	Climate/precipitation
Jennifer Payne	Ecology	Vegetation/aquatic life
Mike Skelly	Groundwater	Groundwater
Mike Barthel	GIS	Geographic data/maps
Danielle Nieto	Field Services	H&S/field coordinator
Martin Baca	Field Services	Stream channel surveys
Zoe Wiesel	Student Intern	General assistance
Darrell Fong	Management	Oversight and review

3.2 Compilation of Existing Data

Existing sources of information will be compiled to generate a comprehensive picture of the hydrologic setting and conditions within the vicinity of Tijeras Arroyo. Geographic information system (GIS) based mapping will be used to analyze and produce aerial photos, topographic maps, surface water drainage maps, geologic maps, soils maps, ecoregion maps, groundwater maps, and vegetation maps. Existing site specific SNL/NM groundwater, surface water, and climate data specific to SNL/NM will be presented. Additionally, existing USGS surface water data will be presented.

Aerial photos will be used to show the study area, in particular, any impoundments, riparian (streamside) vegetation, and the presence or absence of water in the channel. Aerial photos will be used to show the location of surveys conducted as part of the HP, and to calculate stream channel tortuosity.

Topographic maps will be used to show elevation breaks and channel constraints that could indicate a change in hydrology. The topographic maps will also show drainage basin boundaries,

tributaries, and other features that impact surface flow to or from the Tijeras Arroyo. National Hydrography Dataset (NHD) or equivalent quality shapefiles will be used to show the location of stream channels on location maps.

Flow data from a USGS stream gauge (Gauge 08330600; TIJERAS ARROYO NR ALBUQUERQUE, NM) will be used do document frequency of flow in the study reach. Nearly 10 years of data are available for this gauge, starting in October 2007. Flow data will be compared to precipitation data from various rain gage locations upstream in the drainage basin.

Groundwater wells and surface diversions recorded with the New Mexico Office of State Engineer (NMOSE) will be mapped in relation to the Tijeras Arroyo. Wells and surface diversions recorded with the NMOSE will be reviewed for possible effects on surface flow in the water body. Extensive groundwater monitoring within KAFB will provide ample to data to determine any potential groundwater influences on surface flow within Tijeras Arroyo.

Permitted discharges (NPDES permits) will be identified and mapped to evaluate effects on flow. There are several stormwater outfalls within the study area.

Meteorological data will be reviewed to ensure that extreme drought conditions or precipitation events do not bias the field results. Drought conditions will be appraised using the 12-month Standardized Precipitation Index (SPI). The SPI from the National Drought Mitigation Center (NDMC) and the High Plains Regional Climate Center (HPRCC) will be used, as well as an SPI calculated from on-site meteorological data. An index value of zero indicates the median precipitation. A negative index value indicates below normal precipitation, and less than -1.5 is considered drought conditions. Field surveys (HP) will not be conducted when the SPI is less than -1.5.

Ecoregion maps will be used to show large geographic areas that represent ecosystem variations. An ecoregion is characterized by a certain elevation, air temperature, precipitation, terrain, geology, soils, vegetation and fauna. Ecoregion breaks indicate a significant change in landscape-wide characteristics including hydrology, that may support interpretations of where changes in stream flow type (intermittent, ephemeral) occur.

3.3 Collection of New Data

New data will be collected to characterize the hydrological, geomorphic and biological characteristics of the Tijeras Arroyo (Assessment Unit ID NM-9000.A_070) using the NMED Hydrology Protocol. A total of 9 survey locations will be spaced approximately 1 mile apart over the entire length of the AU (Table 2 and Figure 3). The exact location of each survey will be determined using a handheld GPS unit, and work conducted will be photo documented using a digital camera.

Table 2: Description of hydrology protocol survey locations.

Survey Location #	Description of Location	Property Ownership
1	Immediately downstream of I-25	AMAFCA
2	Downstream boundary of Montessa Park	Bernalillo County

Survey Location #	Description of Location	Property Ownership
3	Upstream boundary of Montessa Park	Bernalillo County
4	KAFB South of 6100 Igloos	US Dept. of Defense
5	KAFB South of Wooden Trestle	US Dept. of Defense
6	KAFB near Pennsylvania Ave. Bridge	US Dept. of Defense
7	Upstream boundary of KAFB	US Dept. of Defense
8	Immediately Downstream of Juan Tabo Bridge	City of Albuquerque
9	Immediately Downstream of Four Hills Bridge	City of Albuquerque

The following items will be characterized at each survey location:

Climate and weather will be summarized. Long term climatic conditions within the study area will be described, in particular precipitation patterns and amounts. The weather at the time of field surveys will be documented. NTESS meteorologists will compute the Standardized Precipitation Index (SPI) using on-site data; if the SPI is less than -1.5, the HP will not be conducted.

Stream Modifications and Anthropogenic Impacts will be evaluated using historical aerial photography to identify any major changes to the natural stream channel that have occurred over time. Any man-made structures, channel stabilization, or other activities evident during field surveys will be documented.

Flow in the stream channel is not expected, except during storm events. Any flow or presence of water will be documented. Evidence of recent high waters will be documented. The presence of pools of water and saturated sediment will be documented.

Aquatic life is not expected to be encountered, because flow does not exist except in immediate response to rainfall and snow melt runoff.

Benthic macroinvertebrates will be documented by searching under rocks, root wads, undercut banks, leaf packs, and any other locations that may provide a cool and damp environment. The sandy channel margins will be searched for mussel and aquatic snail shells and caddisfly casings.

Algae and periphyton will be documented by looking for a film or hair like growth on rocks within the stream channel; it is not anticipated that these exist within the reach.

Stream channel sinuosity will be measured using GIS between adjacent transect locations, and for the entire reach. Sinuosity will also be described during field surveys; some portions of the reach are more sinuous than others, and the reasons for this will be investigated.

Differences in upland vegetation and vegetation in the stream channel and adjacent areas will be described. They type and density of vegetation in the channel and on adjacent upland areas will be documented at each transect. If upland vegetation is absent in the stream channel this will be noted.

Floodplain and channel dimensions will be surveyed across its entire width perpendicular to the direction of flow. Stream channel surveys will be conducted on 2-foot intervals, using a construction quality survey level and rod. The surveys will not be tied to known benchmarks, but elevations will be estimated to within +/- several feet using a handheld GPS unit. The floodplains on either side of the active stream channel will not be surveyed on 2-foot intervals, but the width of the flood plain will be measured using GIS tools and documented in the UAA.

In channel structure will be documented. Although water is not anticipated to be present, any riffle-pool sequences that can discerned from the dry channel will be described.

Particle size of streambed substrate will be characterized using a sand gauge reference card or wire screen method. Particle size will also be characterized for an adjacent upland area for comparison with the stream bed.

Hydric soils will be documented within the stream bank. Field guides published by the National Resources Conservation Service will be used to identify hydric soils.

Sediment deposition on plants or debris within the channel will be documented. Upstream sources of anthropogenic sediment will be considered in describing the source and transport of any sediment deposits observed.

Seeps and springs are not known to exist within the reach, but will be documented if encountered.

Iron oxidizing bacteria/fungi will be noted if present. If present, these will present themselves as orange or brown discoloring of rocks and sediments.

All field data will be recorded on the NMED's *Hydrology Determination Field Sheet* (field sheet; Attachment 1), as well as in field notebooks and record sheets as needed. Results of the complete evaluation will be documented on NMED's *Cover Sheet for the Hydrology Protocol UAA for an Ephemeral Stream (*cover sheet; Attachment 2*).*

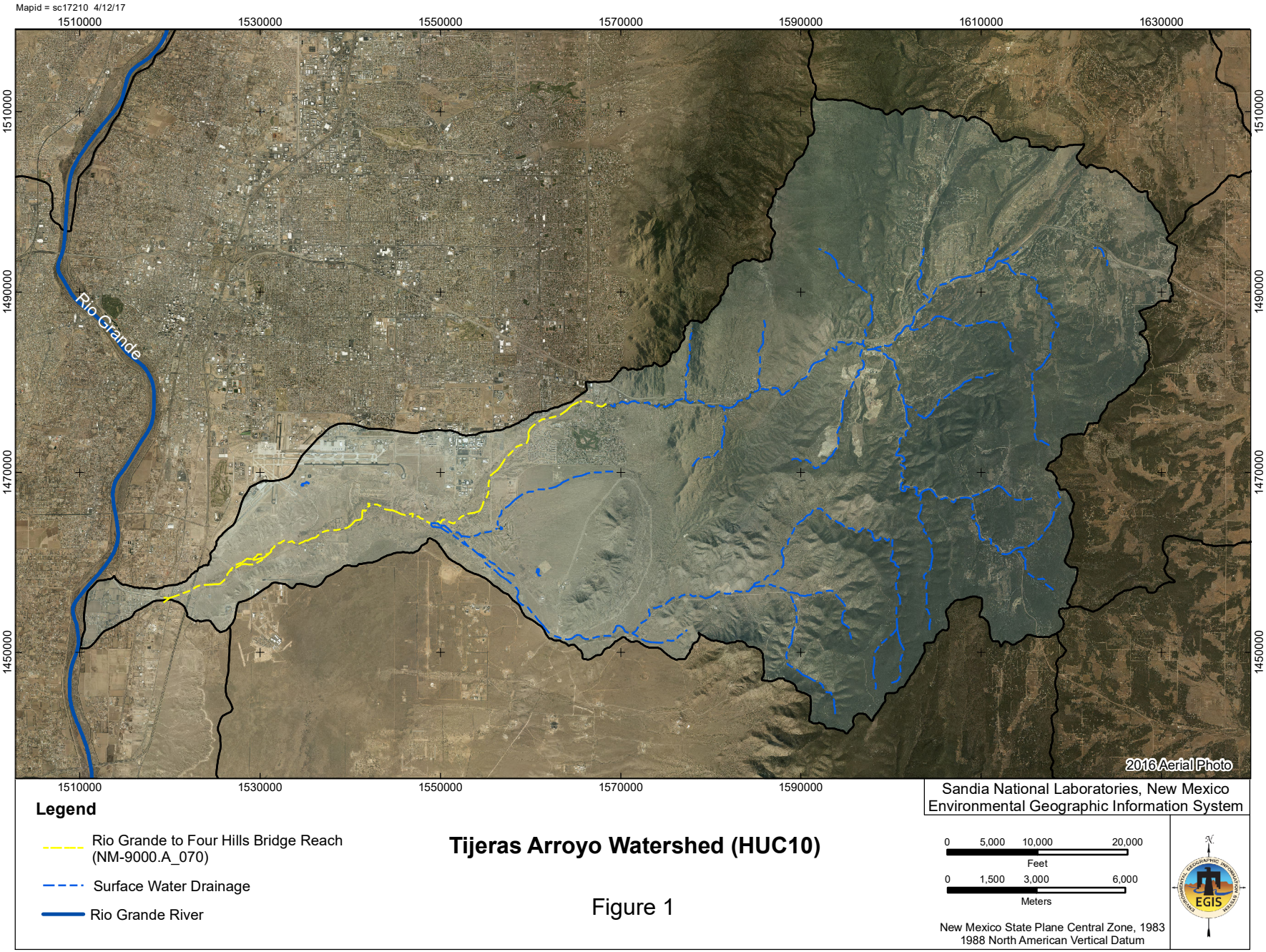
4. Provisions for Public Notice and Consultation with Government Agencies

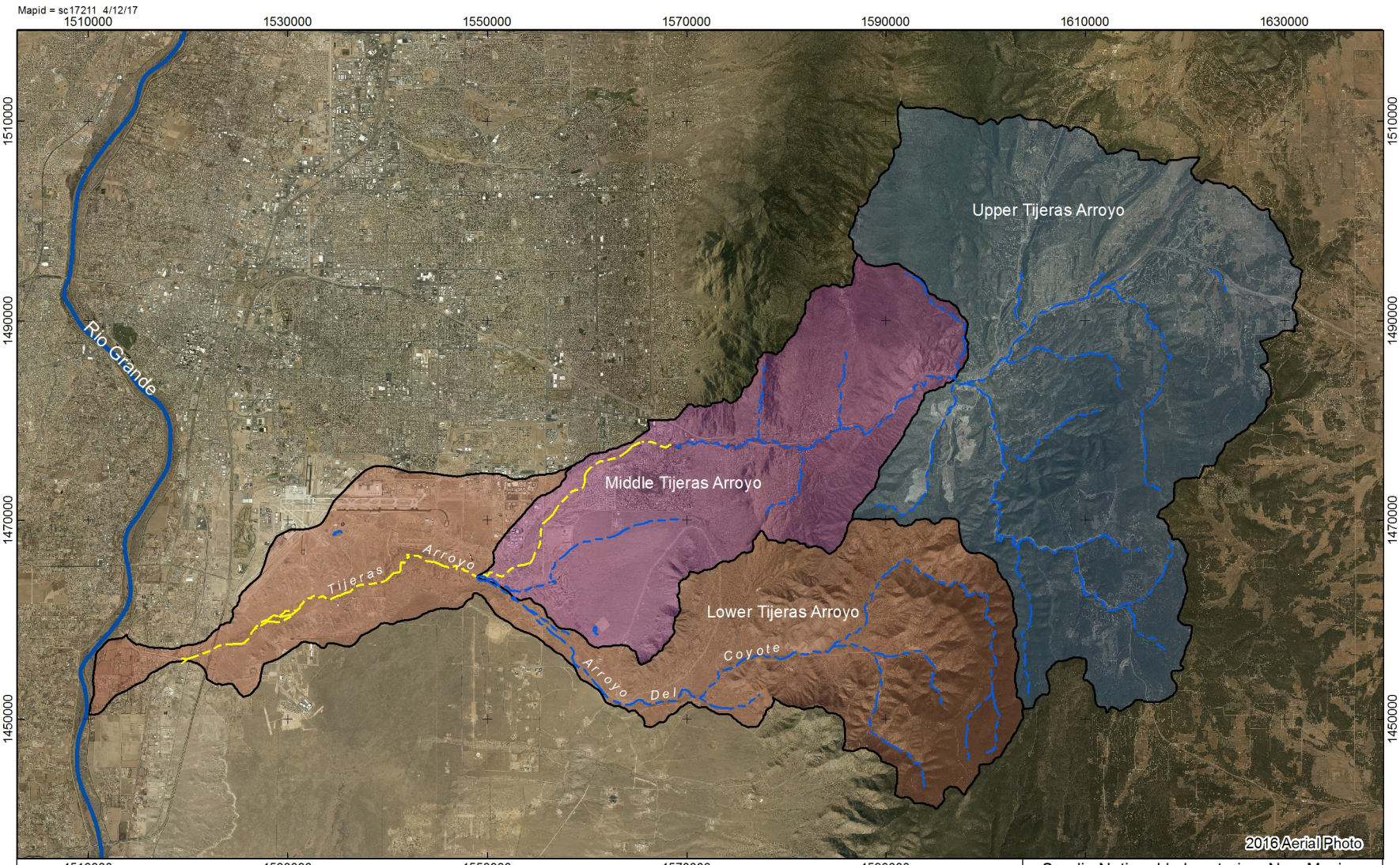
This work plan adheres to the UAA process described in 20.6.2.4 NMAC. NTESS and SFO have consulted with personnel representing Kirtland Airforce Base, Bernalillo County, the City of Albuquerque (COA), and the Albuquerque Metro Area Flood Control Authority (AMAFCA) (the four government entities with jurisdictions through which the reach flows). All of these entities have agreed to provide access to Sandia for the stream surveys described in section 3. There are short sections of the reach that pass through privately owned lands; surveys are not being conducted in these sections to minimize inconvenience to the public.

A 30-day public review and comment period on the UAA will be provided once it has been submitted to NMED for review and approval.

5. Reporting

The Complete UAA will be submitted to NMED for review according to the process described in 20.6.4.15 NMAC Subsection C. Results of the complete evaluation will be documented on NMEDs *Cover Sheet for the Hydrology Protocol UAA for an Ephemeral Stream*. Figures and maps will be included. Attachments to the UAA will provide data tables, stream survey profiles, and phot documentation of stream conditions.


Mapid = sc17210 4/12/17
1510000
1530000
1550000
1570000
1590000
1610000
1630000
1490000
1470000
1450000
Rio Grande
2016 Aerial Photo
Legend
Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
Surface Water Drainage
Rio Grande River
Tijeras Arroyo Watershed (HUC10)
Figure 1
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
0 5,000 10,000 20,000
Feet
0 1,500 3,000 6,000
Meters
New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum
EGIS



Legend

- Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
- Surface Water Drainage
- Rio Grande River

Tijeras Arroyo Sub-Watersheds (HUC12)

Figure 2

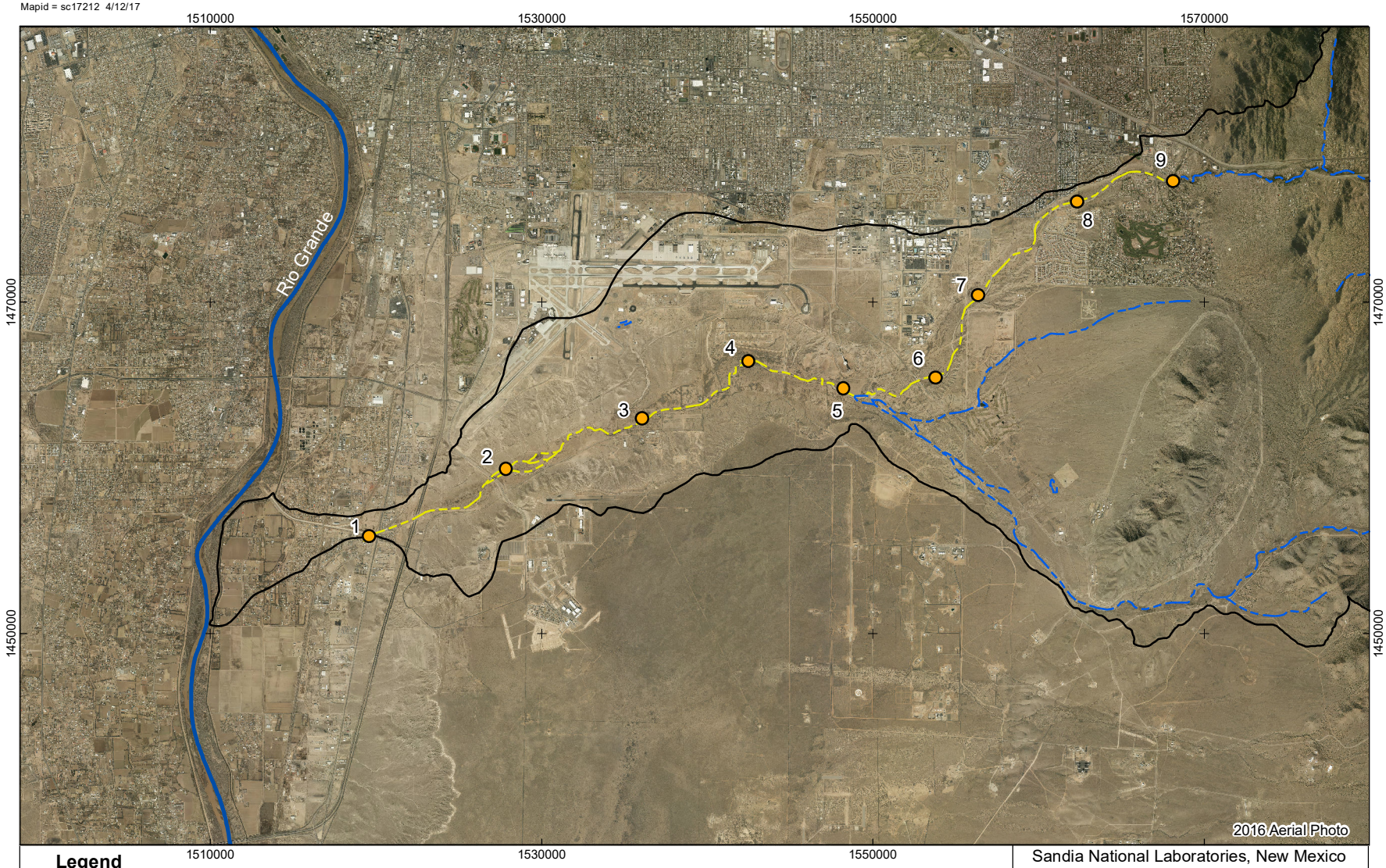
Sandia National Laboratories, New Mexico
Environmental Geographic Information System

0 5,000 10,000 20,000
Feet

0 1,500 3,000 6,000
Meters

New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

Mapid = sc17212 4/12/17



Legend

- Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
- Surface Water Drainage
- Rio Grande River
- Tijeras Arroyo Watershed Boundary (HUC10)
- Proposed Survey Location

Proposed Locations for Hydrology Protocol Surveys

Figure 3

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

0 3,250 6,500 13,000
Feet

0 1,000 2,000 4,000
Meters

New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

Attachment 1

NMED Hydrology Protocol Survey Form

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date:	Stream Name:	Latitude:
Evaluator(s):	Site ID:	Longitude:
TOTAL POINTS: *Stream is at least intermittent if ≥ 12*	Assessment Unit:	Drought Index (12-mo. SPI Value):

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES ___ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES ___ NO **Diversions** ___ YES ___ NO **Discharges** ___ YES ___ NO ****Explain in further detail in NOTES section**

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	**4**	**2**	**0**
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	**2**	**1**	**0**
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	**2**	**1**	**0**
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	**2**	**1**	**0**
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	**2**	**1**	**0**
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.6)	

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	**2**	**1**	**0**
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	**1.5**	**0**	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	**1.5**	**0**

1.11. Hydric Soils	Hydric soils are found within the study reach.	Hydric soils are <u>not</u> found within the study reach.
	Present = 3	**Absent = 0**

1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	**1**	**0.5**	**0**
			TOTAL POINTS (#1.1 – #1.12)	

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
		TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes

NOTES:

LEVEL 1 Field Measurements

Pebble Count Tally Sheet

Site Name: _____ **Storet ID:** _____

Date: _____ **Crew:** _____

Substrate Type	Diameter Range	In-Channel COUNT	In-Channel % Composition	Out of Channel COUNT	Out of Channel % Composition
Silt/Clay	< 0.06 mm				
Sand	0.06 – 2.0 mm (gritty)				
Gravel	2.0 – 64 mm				
Cobble	64 – 256				
Boulder	> 256 mm				
Bedrock	---				

****Please be sure to measure at least 50 pebbles (10 in 5 transects or 5 in 10 transects-depending on stream size) for accurate distributional representation****

INDICATOR #1.8 (*Floodplain and Channel Dimensions*) – MEASUREMENTS & CALCULATIONS**							
Max Depth (#1)	**Bankfull Stage (#2)**	**Maximum Depth Value (#3)**	**2x Maximum Depth Value (#3)**	**Flood-Prone Area Location (#4)**	**Flood-Prone Area Width (#5)**	**Bankfull Width (#6)**	**Floodplain to Active Channel Ratio** (FPA Width / Bankfull Width)

****REFER to Figure 3 on page 19 for clarification**

NMED Surface Water Quality Bureau –
LEVEL 2 Hydrology Determination Field Sheet
Borderline Cases

Date:	Stream Name:	Latitude:
Evaluator(s):	Site ID:	Longitude:
LEVEL 1 Total Points:	Reach Description:	Drought Index (12-mo. SPI Value):

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ **YES** ___ **NO** **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ **YES** ___ **NO** **Diversions** ___ **YES** ___ **NO** **Discharges** ___ **YES** ___ **NO** ****Explain in further detail in NOTES section**

CHECK the appropriate rating for each indicator.

LEVEL 2 INDICATORS	Stream Condition			
	Strong	Moderate	Weak	Poor
2.1. Water in Channel (OPTIONAL)				
2.2. Hyporheic Zone/Groundwater Table				
2.3. Bivalves	**Present =** ___		**Absent =** ___	
2.4. Amphibians	**Present =** ___		**Absent =** ___	
2.5. Macroinvertebrates (abundance/diversity)**				
2.6. EPT Taxa**	**Present =** ___		**Absent =** ___	
2.7. Fish				

** Macroinvertebrates and EPT Taxa should not be rated until identification and enumeration has been performed in a laboratory setting by a qualified aquatic biologist/environmental scientist.

Photo #	Description (US, DS, LB, RB)	Notes

NOTES: (use back-side of this form for additional notes)

_____

_____

_____

Thermograph Deployment/Download/Retrieval Field Sheet

(Last Revision 01/03/2007)

Thermograph #: HOBO / StowAway

Staff at deployment:

Assessment unit:

Water Quality Standards segment: 20.6.4.

Station name/STORET ID:

Location description:

Lat/Long: **GPS: Y / N**

Date/time deployed:

Medium: Water / Air

Estimate % shade on thermograph:

Download record:	Date	Time removed	Time replaced	Staff	Comments
Download 1					
Download 2					
Download 3					
Download 4					
Retrieval:					

File name:

Additional comments:

Cross section sketch: **Plan view sketch:**

Write good directions, draw a good site map, and note triangulation distances.

Take photos from 2 angles (have someone point to or stand next to the thermograph):

PHOTO 1 Description

PHOTO 2 Description

FISH SAMPLING FIELD DATA SHEET

Stream name:	MSB Field No.
Location:	Station ID
Lat N_____________ Lon W_________________ GPS?	River basin:
Elevation __________ m	Investigators:
Designated Use:	Agency:
Form completed by:	Date: Time: / Reason for survey:

SAMPLE COLLECTION	**Gear** ❑ back pack (Model: ________________) ❑ seine (Size/mesh: _____________) ❑ other ____________ **Block nets used?** ❑ Upstream ❑ Downstream ❑ None **Barrier extant?** ❑ Upstream ❑ Downstream **Sampling Duration** Start time __________ End time __________ Shock seconds __________ **Stream width (m)** Max_______Mean_______ **Reach length (m)** ________ **Passes:** ________ Specific conductance ________µS/cm Shocker voltage__________ Shocker settings__________ Water temp _______°C Coincident with habitat survey? ❑ Yes ❑ No Reference reach candidate? ❑ Yes ❑ No
HABITAT TYPES	**Indicate the percentage of each habitat type present** ❑ Riffles_____%❑ Pools_____% ❑ Runs_____% ❑ Snags_____% ❑ Submerged Macrophytes_____% ❑ Other ( )_____%
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: Length (mmTL)/Weight (g) (40 SPECIMEN SUBSAMPLE)					ANOMALIES*							
							D	E	F	L	M	S	T	Z

Attachment 2

NMED Hydrology Protocol Cover Sheet

Cover Sheet
Hydrology Protocol Use Attainability Analysis
for an Ephemeral Stream[1]

Stream Name:	Basin:	8-digit HUC:
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
Current WQS		**Assessment Unit ID:**
☐ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		

Reach Evaluation (How homogeneity of reach hydrology was verified)	
Methods Used:	(ex. aerial photos, "ground truthing", Google™ Earth, etc.)
Reasoning:	Why is the stream homogeneous?

Hydrology Protocol Results		**Notes**
Location 1 (lat/long):	☐ eph ☐ int ☐ per	
Location 2 (lat/long):	☐ eph ☐ int ☐ per	
Location 3 (lat/long):	☐ eph ☐ int ☐ per	
☐ Additional location results attached.		

Hydroclimatic Conditions		**If "yes" please describe.**
Drought (SPI Value < - 1.5)	☐ yes ☐ no	
Recent Rainfall (within 48 hours)	☐ yes ☐ no	
Gauge data available?	☐ yes ☐ no	
If yes for any of above, please explain why these conditions do not impact the UAA conclusion that *natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use*:		

Hydrologic and Other Modifications		**If "yes" please describe.**
Dam/diversion	☐ yes ☐ no	
Channelization/roads	☐ yes ☐ no	
Groundwater pumping	☐ yes ☐ no	
Agricultural return flows	☐ yes ☐ no	
Existing point source discharge	☐ yes ☐ no	
Planned point source discharge	☐ yes ☐ no	

[1] This form is designed for the UAA process for ephemeral waters described in Subsection C of 20.6.4.15 NMAC.

Hydrologic and Other Modifications		If "yes" please describe.
Other modifications e.g., land use practices	☐ yes ☐ no	*Please explain hydrologic impact*
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime:		

Current Uses Observed		If "yes" please describe.
Macroinvertebrates	☐ yes ☐ no	
Fish	☐ yes ☐ no	
Recreation (contact use)	☐ yes ☐ no	
If yes for any of the above, please explain why these observed uses are consistent with the UAA conclusion that 101(a)(2) aquatic life and recreational uses are not feasible:		

Additional Comments:

ATTACHMENTS:

- ☐ Map and Photos (required)
- ☐ Hydrology Protocol Field Sheets for all locations (required)
- ☐ Level 2 Analysis (optional)
- ☐ Additional sites and/or documentation (optional)

CONCLUSION:

This UAA concludes that the stream reach identified above is ephemeral and that Clean Water Act Section 101(a)(2) aquatic life and recreational uses are neither existing nor attainable due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent.* Based on this conclusion, we recommend that the designated uses and criteria identified in 20.6.4.97 NMAC be applied to this stream reach in accordance with the UAA process set forth in Subsection C of 20.6.4.15 NMAC.

Submitted by:

Signed: _____ Date: _____

Surface Water Quality Bureau concurs with recommendation. ☐ Yes ☐ No

If no, see attached reasons.

Signed: _____ Date: _____

EPA Region 6 technical approval granted. ☐ Yes ☐ No

If no, see attached reasons.

Signed: _____ Date: _____

NTESS Exhibit 5

WORK PLAN

USE ATTAINABILITY ANALYSIS FOR TIJERAS ARROYO; RIO GRANDE TO FOUR HILLS BRIDGE REACH (ASSESSMENT UNIT ID NM-9000.A_070)

Sandia National Laboratories

U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
Albuquerque, NM

October 23, 2017





Sandia National Laboratories is a multi-program laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.



Table of Contents

1. Introduction 3
2. Background 3
    2.1 Water Quality Standards, Designated Uses, and Stream Classifications 4
    2.2 Use Attainability Assessment 5
    2.3 Hydrology Protocol 6
3. Scope of Work 7
    3.1 Project Personnel 7
    3.2 Compilation of Existing Data 8
    3.3 Collection of New Data 9
4. Reporting 12
5. Provisions for Public Notice and Consultation with Government Agencies 12

Attachments

1. NMED's *Hydrology Determination Field Sheet*

2. NMED's *Cover Sheet for the Hydrology Protocol UAA for an Ephemeral Stream*

3. NMED Comments and SFO/NTESS Responses

1. Introduction

This work plan was prepared by National Technology and Engineering Solutions of Sandia (NTESS) and the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Sandia Field Office (SFO) to conduct a Use Attainability Analysis (UAA) for a portion of the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM-9000.A_070). This reach of the Tijeras Arroyo receives stormwater discharged from Sandia National Laboratories, New Mexico (SNL/NM).

A UAA is a scientific study conducted for the purpose of assessing the factors affecting the attainment of a designated use. A UAA is required by the U.S. Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) to support determination that a designated use is not supported by a Water of the United States (WOTUS) or a Water of the State of New Mexico. A UAA involves the compilation of hydrological, geomorphic, and biological stream characteristics data through GIS mapping, review of existing information, completion of field surveys, and preparation of a report describing which designated uses are supported by the findings. Results are compiled in a report and submitted to NMED and ultimately to EPA for review and approval.

This work plan describes data and methods that will be used to prepare the UAA. In accordance with the guidelines provided in 20.6.2.4 NMAC, this work plan describes existing information that will be used for the UAA, new data that will be generated during the UAA, factors affecting use attainment that will be analyzed, and provisions for public notice and consultation with government agencies.

This work is being conducted in support of regulatory compliance activities required by National Pollution Discharge Elimination System (NPDES) stormwater permits, specifically, the Multi-Sector General Permit (MSGP) and the Municipal Separate Storm Sewer System (MS4) Permit.

A previous draft of this work plan (v.1, May 5, 2017) was provided to NMED for review and comment. On September 21, 2017 NMED provided comments and suggestions to SFO and NTESS, which have been incorporated into v.2. A copy of NMED comments and SFO/NTESS responses to them are provided in Attachment 3.

2. Background

The headwaters of the Tijeras Arroyo are located in Tijeras Canyon and the foothills of the Sandia and Manzano Mountains east of Kirtland Airforce Base (KAFB). The Tijeras Arroyo flows from east to west and terminates where it discharges to the Rio Grande. The total length of the Tijeras Arroyo is approximately 27.5 miles. For regulatory purposes, NMED divides the Tijeras into two separate assessment units (AUs); Rio Grande to Four Hills Bridge (AU ID NM-9000.A_070) and Four Hills Bridge to Headwater (AU NM-9000.A_001).

SNL/NM discharges stormwater to the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; NM-9000.A_070) within the boundaries of Kirtland Air Force Base (KAFB). The 2016-2018

State of New Mexico Clean Water Act Section 303(d) Integrated Report[1] (303(d) List) identifies the "Water Type" for this reach as ephemeral, but specifies designated uses (and therefore water quality standards) for intermittent waters. A comment for this AU in the 2016-2018 State of New Mexico Clean Water Act 303(d) Integrated List states:

> *Application of the [Surface Water Quality Bureau] SWQB Hydrology Protocol (survey date 6/24/09) indicate [SIC] this assessment unit is ephemeral (Hydrology Protocol score of 3.0 with 89.1% days with no flow at USGS gage 08330600 – see http://www.nmenv.state.nm.us/swqb/Hydrology for additional details on the protocol). NMED must complete the process detailed in 20.6.4.15 NMAC Subsection C in order to a [SIC] waterbody under 20.6.4.97 NMAC. Until such time, this waterbody will remain under 20.6.4.98 NMAC.*

The "process detailed in 20.6.4.15 NMAC Subsection C" is the UAA. NTESS and SFO propose conducting the UAA in order to ensure consistent and appropriate regulation of stormwater discharges from SNL/NM.

2.1 Water Quality Standards, Designated Uses, and Stream Classifications

In New Mexico, water quality standards (WQS) are based upon the designated uses of a water body. Designated uses are assigned by NMED (and approved by EPA) with consideration to the flow regime of the water body (perennial, intermittent, or ephemeral); therefore, WQS are largely a function of whether the water body is perennial, intermittent, or ephemeral.

Intermittent waters have more stringent WQS than ephemeral waters. This is due to the types of aquatic life intermittent waters support, as well as their recreational and economic uses. The terms intermittent and ephemeral are defined as follows in 20.6.4.7 NMAC:

Intermittent: *when used to describe a surface water of the state means the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow.*

Ephemeral: *when used to describe a surface water of the state means the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region.*

The uses designated for intermittent water bodies and their definitions (20.6.4.98 NMAC) are:

- *livestock watering* (use of a surface water for consumption by livestock),
- *wildlife habitat* (surface water used by plants or animals not considered as pathogens, or vectors for pathogens, or intermediate hosts for pathogens for humans or domesticated livestock and plants),
- *marginal warmwater aquatic life* (natural habitat conditions severely limit the ability of the surface water to sustain a natural aquatic life population on a continuous basis), and

[1] State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report, Appendix A – Integrated List, page 203 (2016).

- *primary contact* (any recreational or other water use in which there is prolonged or intimate human contact with water, such as swimming and water skiing, involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, or any use of the surface water for cultural, religious, or ceremonial purposes in which there is intimate human contact with the water).

The uses designated for ephemeral water bodies (20.6.4.97 NMAC) are:

- *livestock watering* (use of a surface water for consumption by livestock),
- *wildlife habitat* (surface water used by plants or animals not considered as pathogens, or vectors for pathogens, or intermediate hosts for pathogens for humans or domesticated livestock and plants),
- *limited aquatic life* (the surface water is capable of supporting only a limited community of aquatic life), and
- *secondary contact* (a water in which recreational contact may occur, and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, boating, and limited seasonal contact).

In New Mexico, non-perennial waters (intermittent and ephemeral) are regulated by default under 20.6.4.98 NMAC, unless a UAA has been conducted and indicates a specific water should be classified under 20.6.4.97. In other words, NMED presumes that all waters can support the uses listed under 20.6.4.98 unless a UAA demonstrates otherwise.

2.2 Use Attainability Assessment

A UAA is a scientific study conducted for the purpose of assessing the factors affecting the attainment of a designated use. A UAA must be conducted before a designated use can be removed or changed to a category requiring less stringent criteria, and it must demonstrate that attainment of the use is not feasible based on at least one of the factors identified in federal regulation at 40 CFR 131.10(g):

1) *Naturally occurring pollutant concentrations prevent the attainment of the use;*
2) *Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met;*
3) *Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;*
4) *Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use;*
5) *Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses;*

6) *Controls more stringent than those required by sections 301(b) and 306 [technology-based effluent limitations] of the Act would result in substantial and widespread economic and social impact.*

Of particular relevance to the Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo are factors 2 and 5, which will likely be the factors that determine if the water is intermittent or ephemeral. Flow in Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM 9000.A_070) occurs infrequently and only in direct response to precipitation events. For this reason, our analysis will focus largely on the occurrence of water and flow and how it limits the reach's ability to support "marginal warmwater aquatic life" and "primary contact" designated uses. The scoring system provided by the Hydrology Protocol will be used to quantify if the reach is intermittent or ephemeral, but supporting information and analysis will be provided.

2.3 Hydrology Protocol

NMED allows for an expedited UAA process for certain ephemeral waters; this process will be utilized under this work plan. The expedited UAA process focuses on evaluating the aquatic life and contact uses, and is based on a field survey method developed by NMED called the *Hydrology Protocol* (HP). The HP is described in detail in *Hydrology Protocol for the Determination of Uses Supported by Ephemeral, Intermittent, and Perennial Waters,* and in Section II.C of *New Mexico's Water Quality Management Plan and Continuing Planning Process*. A brief summary is provided below.

The HP is guided by field survey sheets containing specific questions that evaluate the hydrological, geomorphic and biological indicators of the persistence of water. A scoring system enables the user to evaluate which aquatic life and contact uses are supported by the water body, and therefore, if the water is intermittent or perennial. The HP is organized into a Level 1 and Level 2 evaluation. The Level 1 evaluation consists of a total of 14 "indicators" (1.1 through 1.14). The HP instructs the user that a total score of less than 2 on indicators 1.1 through 1.6 indicates "the stream is ephemeral; you may stop the evaluation at this point". SFO and NTESS will however, accept NMED's recommendation that indicators 1.1 through 1.14 be evaluated regardless of the score obtained from indicators 1.1. through 1.6, in order to provide the most thorough evaluation possible. Data gathered during the Level 1 evaluation are usually adequate to indicate the hydrological status of the stream. If the Level 1 evaluation is inconclusive, a Level 2 evaluation may be conducted.

Field work will be conducted in collaboration with NMED to ensure proper HP implementation and concurrence on scoring. Representatives from NMED will provide input and be present during field activities, and will serve in an advisory capacity rather than an oversight role. SFO and NTESS will serve as project managers and will be responsible for ensuring the HP is conducted according to this work plan and applicable regulations. HP indicator scores will be developed through consultation with NMED with the goal of reaching a consensus. A final determination will be made by SFO and NTESS. All work will be conducted under the NTESS health and safety program.

Results of the HP are incorporated into the UAA as described in Subsection C of 20.6.4.15 NMAC. In addition to the HP, the UAA will present existing information regarding the hydrology, climate, geography, land use, wildlife, vegetation, and any other pertinent information.

3. Scope of Work

This scope of work is guided by requirements listed in Subsection C of 20.6.4.15 NMAC and the NMED document *Hydrology Protocol for the Determination of Uses Supported by Ephemeral, Intermittent, and Perennial Waters.* SFO and NTESS will rely on both existing data as well as newly generated data to compile the UAA.

The study area will include the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM-9000.A_070) and the surrounding area having the potential to impact flows within the reach. The HUC 10 watershed boundary (Tijeras Arroyo) that encompasses this area is shown in Figure 1. The HUC 12 watershed boundaries (Upper Tijeras Arroyo, Middle Tijeras Arroyo, and Lower Tijeras Arroyo) that contribute flow to this reach are shown in Figure 2.

3.1 Project Personnel

A multidisciplinary staff of environmental professionals including, geologists, hydrologists, water quality specialists, biologists, ecologists, meteorologists, geographers, GIS analysts, and field technicians will be utilized to compile the UAA.

The project team for this work will he led by the Stormwater Program. The primary team members are listed in Table 1 below, however, additional expertise will be leveraged as needed.

Table 1: Primary UAA team members.

Team Member	SNL/NM Program	Primary UAA Role
John Kay	Stormwater	Project Lead/geology
Kathie Deal	Stormwater	Program Lead/regulatory review
Carolyn Daniel	Stormwater	Flow and water quality
Jamie Gomez	Stormwater	Sediment/soil
Regina Deola	Meteorology	Climate/precipitation
Jennifer Payne	Ecology	Vegetation/aquatic life
Mike Skelly	Groundwater	Groundwater
Mike Barthel	GIS	Geographic data/maps
Zach Tenorio	Field Services	Stream channel surveys, general assistance
Martin Baca	Field Services	Stream channel surveys, general assistance
Zoe Wiesel	Student Intern	General assistance
Darrell Fong	Management	Oversight and review
Steve Black	SFO	Oversight and review

3.2 Compilation of Existing Data

Existing sources of information will be compiled to generate a comprehensive picture of the hydrologic setting and conditions within the vicinity of Tijeras Arroyo. Geographic information system (GIS) based mapping will be used to analyze and produce aerial photos, topographic maps, surface water drainage maps, geologic maps, soils maps, ecoregion maps, groundwater maps, and vegetation maps. Existing site-specific SNL/NM groundwater, surface water, and climate data specific to SNL/NM will be presented. Additionally, existing USGS surface water data will be presented.

Aerial photos will be used to show the study area, in particular, any impoundments, riparian (streamside) vegetation, and the presence or absence of water in the channel. Aerial photos will be used to show the location of surveys conducted as part of the HP, and to calculate stream channel tortuosity.

Geologic and soil maps will be used to describe the local geologic formations and soil types found within the study area. An overview of the geologic setting and history of the area will be provided. The geology and soils will be discussed relevant to their influence on local hydrology and the occurrence of flow within Tijeras Arroyo.

Topographic maps will be used to show elevation breaks and channel constraints that could indicate a change in hydrology. The topographic maps will also show drainage basin boundaries, tributaries, and other features that impact surface flow to or from the Tijeras Arroyo. National Hydrography Dataset (NHD) or equivalent quality shapefiles will be used to show the location of stream channels on location maps.

Flow data from a USGS stream gauge (Gauge 08330600; TIJERAS ARROYO NR ALBUQUERQUE, NM) will be used do document frequency of flow in the study reach. Nearly 20 years of data are available for this gauge, starting in 1996. Flow data will be compared to precipitation data from various rain gage locations upstream in the drainage basin.

Groundwater wells and surface diversions recorded with the New Mexico Office of State Engineer (NMOSE) will be mapped in relation to the Tijeras Arroyo. Groundwater and surface water diversions recorded with the NMOSE will be reviewed for possible effects on surface flow in the water body. Extensive groundwater monitoring within KAFB will provide ample to data to determine any potential groundwater influences on surface flow within Tijeras Arroyo.

Permitted discharges (NPDES permits) will be identified and mapped to evaluate effects on flow. There are several stormwater outfalls within the study area.

Meteorological data will be reviewed to ensure that extreme drought conditions or precipitation events do not bias the field results. Drought conditions will be appraised using the 12-month Standardized Precipitation Index (SPI). The SPI from the National Drought Mitigation Center (NDMC) will be used, as well as an SPI calculated from on-site meteorological data. An index value of zero indicates the median precipitation. A negative index value indicates below normal precipitation, and less than -1.5 is considered drought conditions. Field surveys (HP) will not be conducted when the SPI is less than -1.5.

Ecoregion maps will be used to show large geographic areas that represent ecosystem variations. An ecoregion is characterized by a certain elevation, air temperature, precipitation, terrain, geology, soils, vegetation and fauna. Ecoregion breaks indicate a significant change in landscape-wide characteristics including hydrology, that may support interpretations of where changes in stream flow type (intermittent, ephemeral) occur.

3.3 Collection of New Data

New data will be collected to characterize the hydrological, geomorphic and biological characteristics of the Tijeras Arroyo (Assessment Unit ID NM-9000.A_070) using the NMED Hydrology Protocol. A total of 9 survey locations will be spaced approximately 1 mile apart over the entire length of the AU (Table 2 and Figure 3). The exact location of each survey will be determined using a handheld GPS unit, and work conducted will be photo documented using a digital camera.

Table 2: Description of hydrology protocol survey locations.

Survey Location #	Description of Location	Latitude	Longitude	Property Ownership
1	Immediately downstream of I-25	35.0009	-106.6534	AMAFCA
2	Downstream boundary of Montessa Park	35.0121	-106.6258	Bernalillo County
3	Upstream boundary of Montessa Park	35.02060	-106.5985	Bernalillo County
4	KAFB South of 6100 Igloos	35.03013	-106.5770	U.S. Department of Defense
5	KAFB South of Wooden Trestle	35.02567	-106.5579	U.S. Department of Defense
6	KAFB near Pennsylvania Ave. Bridge	35.02743	-106.5394	U.S. Department of Defense
7	Upstream boundary of KAFB	35.0411	-106.5308	U.S. Department of Defense
8	Downstream of Juan Tabo Road Bridge	35.0568	-106.51097	City of Albuquerque
9	Immediately Downstream of Four Hills Bridge	35.0602	-106.4916	City of Albuquerque

The following items will be characterized at each survey location:

Photo Documentation will be conducted at each transect location, including upstream and downstream aspects, according to the methods described in the United States Department of Agriculture/Forest Service Photo Point Monitoring Handbook, Part A- Field Procedures (General Technical Report PNW-GTR-526, 2002).

Climate and weather will be summarized. Long term climatic conditions within the study area will be described, in particular precipitation patterns and amounts. The weather at the time of field surveys will be documented. NTESS meteorologists will compute the Standardized Precipitation Index (SPI) using on-site data; if the SPI is less than -1.5 the HP will be postponed until sufficient rainfall occurs to raise the SPI above -1.5.

Stream Modifications and Anthropogenic Impacts will be evaluated using historical aerial photography to identify any major changes to the natural stream channel that have occurred over time. Any man-made structures, channel stabilization, or other activities evident during field surveys will be documented.

Flow in the stream channel or the presence of any standing water will be documented. Evidence of recent high waters will be documented. The presence of pools of water and saturated sediment will be documented.

Aquatic life will be surveyed and documented.

Benthic macroinvertebrates will be documented by searching under rocks, root wads, undercut banks, leaf packs, and any other locations that may provide a cool and damp environment. The sandy channel margins will be searched for mussel and aquatic snail shells and caddisfly casings.

Algae and periphyton will be documented by looking for a film or hair like growth on rocks within the stream channel; it is not anticipated that these exist within the reach.

Stream channel sinuosity will be measured using GIS between adjacent transect locations, and for the entire reach. Sinuosity will also be described during field surveys; some portions of the reach are more sinuous than others, and the reasons for this will be investigated.

Differences in upland vegetation and vegetation in the stream channel and adjacent areas will be described. They type and density of vegetation in the channel and on adjacent upland areas will be documented at each transect. If upland vegetation is absent in the stream channel this will be noted.

Floodplain and channel dimensions will be surveyed across its entire width perpendicular to the direction of flow. Stream channel surveys will be conducted on 2-foot intervals, using a construction quality survey level and rod. The surveys will not be tied to known benchmarks, but elevations will be estimated to within +/- several feet using a handheld GPS unit. The floodplains

on either side of the active stream channel will not be surveyed on 2-foot intervals, but the width of the flood plain will be measured using GIS tools and documented in the UAA.

In channel structure will be documented; riffle-pool sequences that can discerned from the dry channel will be described.

Particle size of streambed substrate will be characterized using a sand gauge reference card or wire screen method. Particle size will also be characterized for an adjacent upland area for comparison with the stream bed.

Hydric soils will be documented within the stream bank. Field guides published by the National Resources Conservation Service will be used to identify hydric soils.

Sediment deposition on plants or debris within the channel will be documented. Upstream sources of anthropogenic sediment will be considered in describing the source and transport of any sediment deposits observed.

Seeps and springs are not known to exist within the reach, but will be documented if encountered.

Iron oxidizing bacteria/fungi will be noted if present. If present, these will present themselves as orange or brown discoloring of rocks and sediments.

All field data will be recorded on the NMED's *Hydrology Determination Field Sheet* (field sheet; Attachment 1), as well as in field notebooks and record sheets as needed. Results of the complete evaluation will be documented on NMED's *Cover Sheet for the Hydrology Protocol UAA for an Ephemeral Stream* (Attachment 2).

4. Reporting

The completed UAA will be submitted to NMED for review according to the process described in 20.6.4.15 NMAC, Subsection C. Results of the complete evaluation will be documented on NMED's *Cover Sheet for the Hydrology Protocol UAA for an Ephemeral Stream*. Figures and maps will be included. Attachments to the UAA will provide data tables, stream survey profiles, and photo documentation of stream conditions.

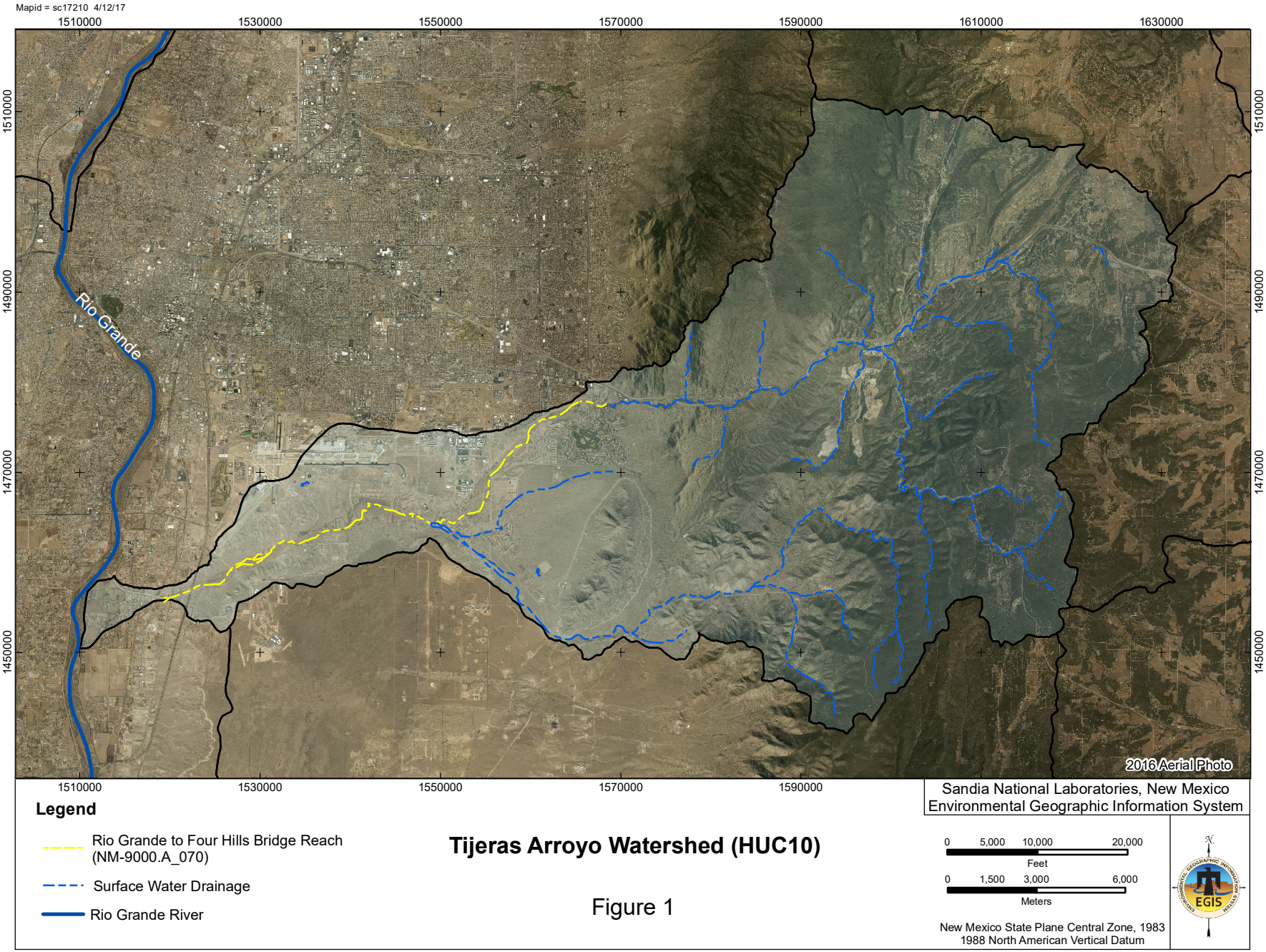
5. Provisions for Public Notice and Consultation with Government Agencies

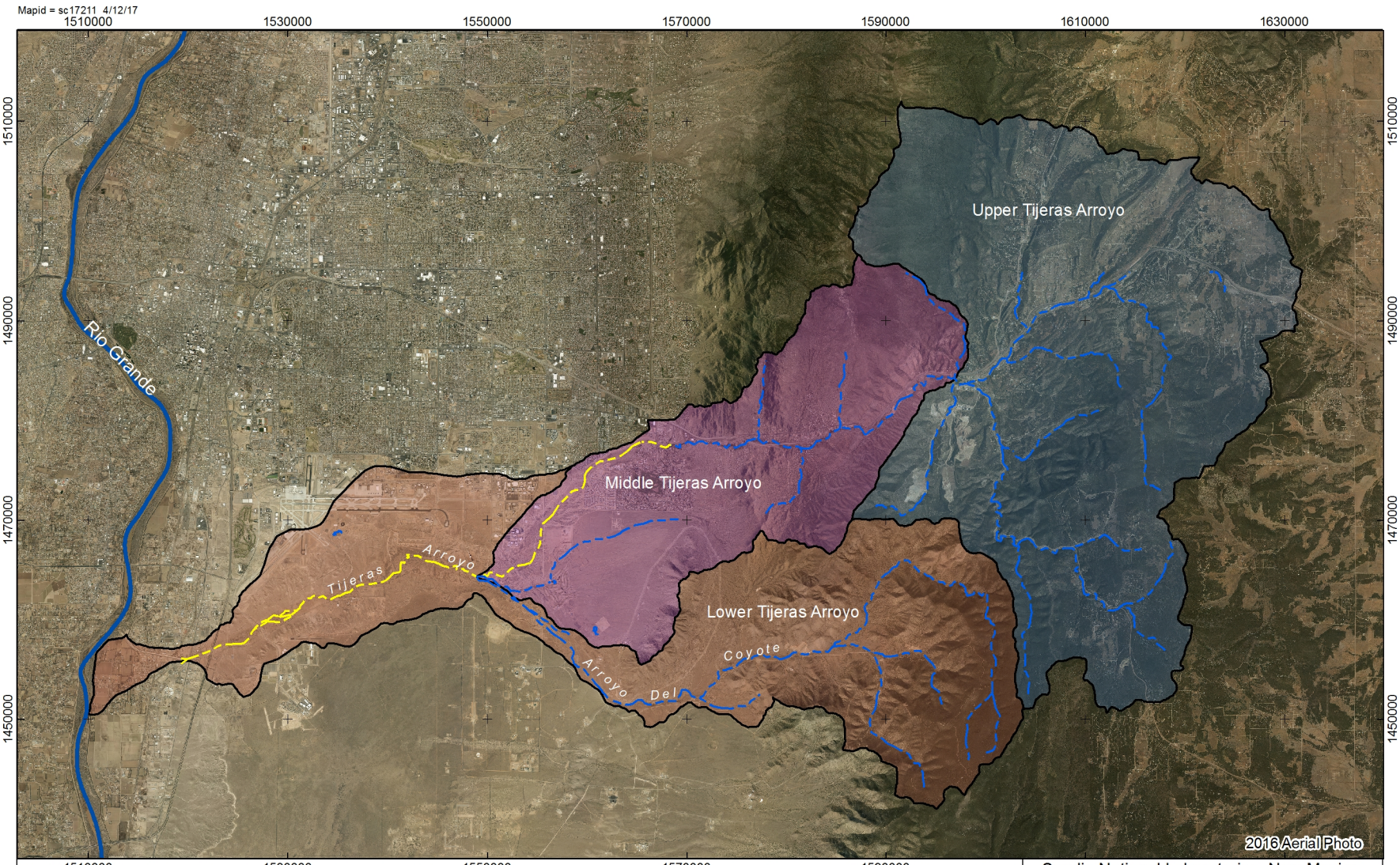
This work plan adheres to the UAA process described in 20.6.4 NMAC. NTESS and SFO have consulted with personnel representing Kirtland Airforce Base, Bernalillo County, the City of Albuquerque (COA), and the Albuquerque Metro Area Flood Control Authority (AMAFCA) (the four government entities with jurisdictions through which the reach flows). All of these entities have agreed to provide access to Sandia for the stream surveys described in Section 3. There are short sections of the reach that pass through privately owned lands; surveys are not being conducted in these sections to minimize inconvenience to the public.

Upon completion of field work, SFO and NTESS will submit the HP UAA to NMED for review. If the UAA demonstrates to the satisfaction of NMED that fishable-swimmable uses are not

attainable in the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach; Assessment Unit ID NM-9000.A_070), the process described in Subsection C of 20.6.4.15 NMAC will be followed. Accordingly, SFO and NTESS will issue a public notice followed by a 30-day public comment period. NMED will publish the UAA on its website and notify interested parties of the 30-day public comment period. After addressing any comments received, SFO and NTESS will submit the final UAA, including a response to comments, to NMED for review and concurrence. NMED will submit the final UAA and response to comments to EPA Region 6 for technical approval. If the technical approval is granted, the reach will be subject to 20.6.4.97 NMAC. NMED will petition the Water Quality Control Commission (WQCC) to list the reach under Subsection C of 20.6.4.97 NMAC during the next triennial review of water quality standards.

If NMED does not concur with the conclusions of the UAA, the third party UAA process described in Subsection D of 20.6.4.15 NMAC may be followed. Under this subsection, SFO and NTESS would petition the WQCC for a regular UAA hearing to modify the water quality standards.


Mapid = sc17210 4/12/17
1510000
1530000
1550000
1570000
1590000
1610000
1630000
1490000
1470000
1450000
Rio Grande
2016 Aerial Photo
Legend
Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
Surface Water Drainage
Rio Grande River
Tijeras Arroyo Watershed (HUC10)
Figure 1
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
0 5,000 10,000 20,000
Feet
0 1,500 3,000 6,000
Meters
New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum
EGIS



Legend

- Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
- Surface Water Drainage
- Rio Grande River

Tijeras Arroyo Sub-Watersheds (HUC12)

Figure 2

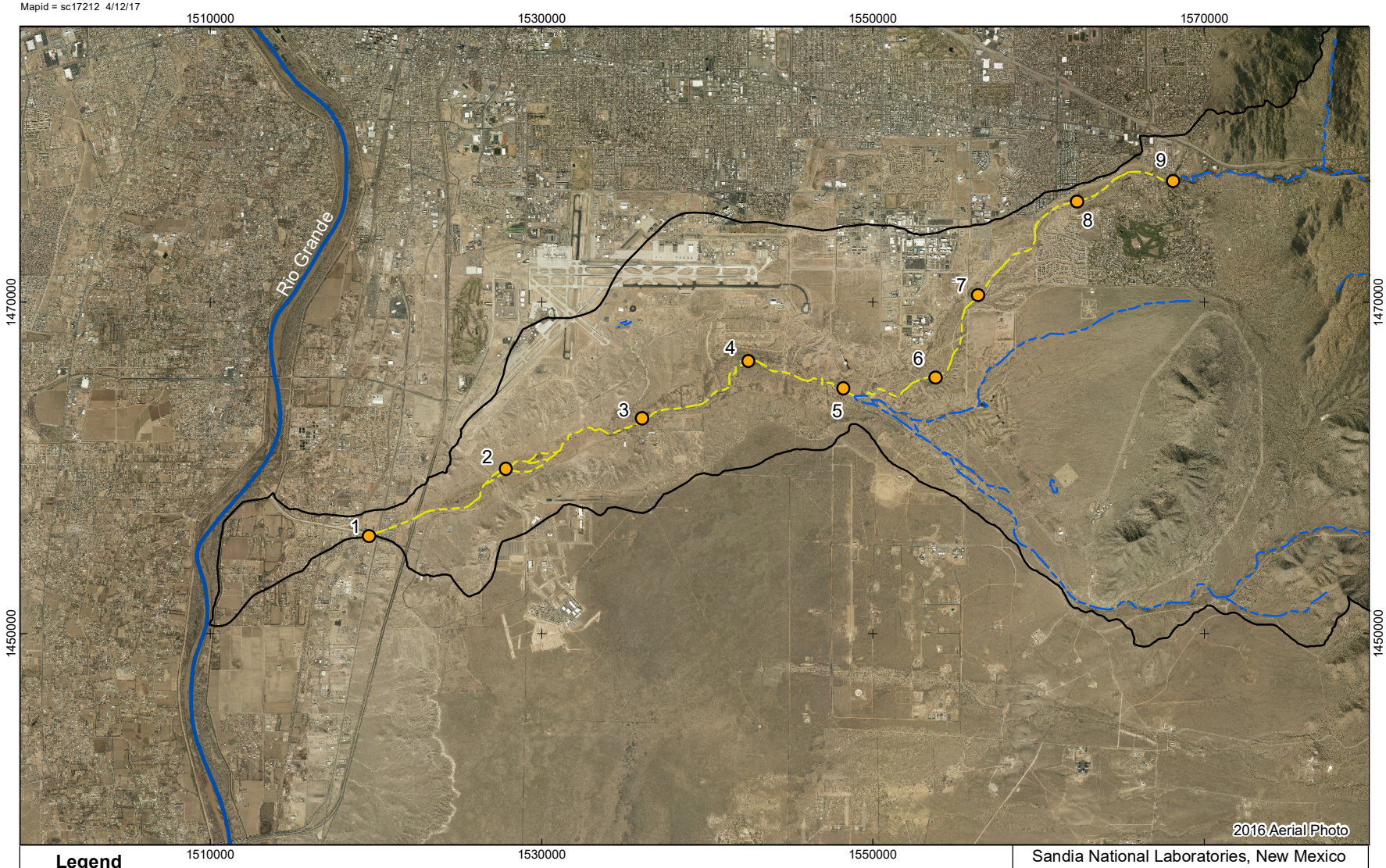
Sandia National Laboratories, New Mexico
Environmental Geographic Information System

0 5,000 10,000 20,000
Feet

0 1,500 3,000 6,000
Meters

New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

Mapid = sc17212 4/12/17



Legend

- Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
- Surface Water Drainage
- Rio Grande River
- Tijeras Arroyo Watershed Boundary (HUC10)
- Proposed Survey Location

Proposed Locations for Hydrology Protocol Surveys

Figure 3

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

0 3,250 6,500 13,000
Feet

0 1,000 2,000 4,000
Meters

New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

Attachment 1

NMED Hydrology Protocol Survey Form

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date:	Stream Name:	Latitude:
Evaluator(s):	Site ID:	Longitude:
TOTAL POINTS: *Stream is at least intermittent if ≥ 12*	Assessment Unit:	Drought Index (12-mo. SPI Value):

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES ___ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES ___ NO **Diversions** ___ YES ___ NO **Discharges** ___ YES ___ NO ****Explain in further detail in NOTES section**

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	**4**	**2**	**0**
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	**2**	**1**	**0**
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	**2**	**1**	**0**
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	**2**	**1**	**0**
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	**2**	**1**	**0**
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.6)	

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	**2**	**1**	**0**
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	**1.5**	**0**	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	**1.5**	**0**

1.11. Hydric Soils	Hydric soils are found within the study reach.	Hydric soils are <u>not</u> found within the study reach.
	Present = 3	**Absent = 0**

1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	**1**	**0.5**	**0**
			TOTAL POINTS (#1.1 – #1.12)	

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
		TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes

NOTES:

LEVEL 1 Field Measurements

Pebble Count Tally Sheet

Site Name: _____ **Storet ID:** _____

Date: _____ **Crew:** _____

Substrate Type	Diameter Range	In-Channel COUNT	In-Channel % Composition	Out of Channel COUNT	Out of Channel % Composition
Silt/Clay	< 0.06 mm				
Sand	0.06 – 2.0 mm (gritty)				
Gravel	2.0 – 64 mm				
Cobble	64 – 256				
Boulder	> 256 mm				
Bedrock	---				

****Please be sure to measure at least 50 pebbles (10 in 5 transects or 5 in 10 transects-depending on stream size) for accurate distributional representation****

INDICATOR #1.8 (*Floodplain and Channel Dimensions*) – MEASUREMENTS & CALCULATIONS**							
Max Depth (#1)	**Bankfull Stage (#2)**	**Maximum Depth Value (#3)**	**2x Maximum Depth Value (#3)**	**Flood-Prone Area Location (#4)**	**Flood-Prone Area Width (#5)**	**Bankfull Width (#6)**	**Floodplain to Active Channel Ratio** (FPA Width / Bankfull Width)

****REFER to Figure 3 on page 19 for clarification**

NMED Surface Water Quality Bureau –
LEVEL 2 Hydrology Determination Field Sheet
Borderline Cases

Date:	Stream Name:	Latitude:
Evaluator(s):	Site ID:	Longitude:
LEVEL 1 Total Points:	Reach Description:	Drought Index (12-mo. SPI Value):

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ **YES** ___ **NO** **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ **YES** ___ **NO** **Diversions** ___ **YES** ___ **NO** **Discharges** ___ **YES** ___ **NO** ****Explain in further detail in NOTES section**

CHECK the appropriate rating for each indicator.

LEVEL 2 INDICATORS	Stream Condition			
	Strong	Moderate	Weak	Poor
2.1. Water in Channel (OPTIONAL)				
2.2. Hyporheic Zone/Groundwater Table				
2.3. Bivalves	**Present =** ___		**Absent =** ___	
2.4. Amphibians	**Present =** ___		**Absent =** ___	
2.5. Macroinvertebrates (abundance/diversity)**				
2.6. EPT Taxa**	**Present =** ___		**Absent =** ___	
2.7. Fish				

** Macroinvertebrates and EPT Taxa should not be rated until identification and enumeration has been performed in a laboratory setting by a qualified aquatic biologist/environmental scientist.

Photo #	Description (US, DS, LB, RB)	Notes

NOTES: (use back-side of this form for additional notes)

_____

_____

_____

Thermograph Deployment/Download/Retrieval Field Sheet

(Last Revision 01/03/2007)

Thermograph #: HOBO / StowAway

Staff at deployment:

Assessment unit:

Water Quality Standards segment: 20.6.4.

Station name/STORET ID:

Location description:

Lat/Long: **GPS: Y / N**

Date/time deployed:

Medium: Water / Air

Estimate % shade on thermograph:

Download record:	Date	Time removed	Time replaced	Staff	Comments
Download 1					
Download 2					
Download 3					
Download 4					
Retrieval:					

File name:

Additional comments:

Cross section sketch: **Plan view sketch:**

Write good directions, draw a good site map, and note triangulation distances.

Take photos from 2 angles (have someone point to or stand next to the thermograph):

PHOTO 1 Description

PHOTO 2 Description

FISH SAMPLING FIELD DATA SHEET

Stream name:	MSB Field No.
Location:	Station ID
Lat N_____________ Lon W_________________ GPS?	River basin:
Elevation __________ m	Investigators:
Designated Use:	Agency:
Form completed by:	Date: Time:
	Reason for survey:

SAMPLE COLLECTION	**Gear** ❑ back pack (Model: ________________) ❑ seine (Size/mesh: _____________) ❑ other ____________ **Block nets used?** ❑ Upstream ❑ Downstream ❑ None **Barrier extant?** ❑ Upstream ❑ Downstream **Sampling Duration** Start time __________ End time __________ Shock seconds __________ **Stream width (m)** Max_______Mean_______ **Reach length (m)** ________ **Passes:** ________ Specific conductance ________µS/cm Shocker voltage__________ Shocker settings__________ Water temp _______°C Coincident with habitat survey? ❑ Yes ❑ No Reference reach candidate? ❑ Yes ❑ No
HABITAT TYPES	**Indicate the percentage of each habitat type present** ❑ Riffles_____%❑ Pools_____% ❑ Runs_____% ❑ Snags_____% ❑ Submerged Macrophytes_____% ❑ Other ( )_____%
GENERAL COMMENTS	

SPECIES	**TOTAL (COUNT)**	**OPTIONAL: Length (mmTL)/Weight (g) (40 SPECIMEN SUBSAMPLE)**					**ANOMALIES***							
							D	**E**	**F**	**L**	**M**	**S**	**T**	**Z**

Attachment 2

NMED Hydrology Protocol Cover Sheet

Cover Sheet
Hydrology Protocol Use Attainability Analysis
for an Ephemeral Stream[1]

Stream Name:	Basin:	8-digit HUC:
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
Current WQS		**Assessment Unit ID:**
☐ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		

Reach Evaluation (How homogeneity of reach hydrology was verified)	
Methods Used:	(ex. aerial photos, "ground truthing", Google™ Earth, etc.)
Reasoning:	Why is the stream homogeneous?

Hydrology Protocol Results		**Notes**
Location 1 (lat/long):	☐ eph ☐ int ☐ per	
Location 2 (lat/long):	☐ eph ☐ int ☐ per	
Location 3 (lat/long):	☐ eph ☐ int ☐ per	
☐ Additional location results attached.		

Hydroclimatic Conditions		**If "yes" please describe.**
Drought (SPI Value < - 1.5)	☐ yes ☐ no	
Recent Rainfall (within 48 hours)	☐ yes ☐ no	
Gauge data available?	☐ yes ☐ no	
If yes for any of above, please explain why these conditions do not impact the UAA conclusion that *natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use*:		

Hydrologic and Other Modifications		**If "yes" please describe.**
Dam/diversion	☐ yes ☐ no	
Channelization/roads	☐ yes ☐ no	
Groundwater pumping	☐ yes ☐ no	
Agricultural return flows	☐ yes ☐ no	
Existing point source discharge	☐ yes ☐ no	
Planned point source discharge	☐ yes ☐ no	

[1] This form is designed for the UAA process for ephemeral waters described in Subsection C of 20.6.4.15 NMAC.

Hydrologic and Other Modifications		If "yes" please describe.
Other modifications e.g., land use practices	☐ yes ☐ no	*Please explain hydrologic impact*
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime:		

Current Uses Observed		If "yes" please describe.
Macroinvertebrates	☐ yes ☐ no	
Fish	☐ yes ☐ no	
Recreation (contact use)	☐ yes ☐ no	
If yes for any of the above, please explain why these observed uses are consistent with the UAA conclusion that 101(a)(2) aquatic life and recreational uses are not feasible:		

Additional Comments:

ATTACHMENTS:

- ☐ Map and Photos (required)
- ☐ Hydrology Protocol Field Sheets for all locations (required)
- ☐ Level 2 Analysis (optional)
- ☐ Additional sites and/or documentation (optional)

CONCLUSION:

This UAA concludes that the stream reach identified above is ephemeral and that Clean Water Act Section 101(a)(2) aquatic life and recreational uses are neither existing nor attainable due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent.* Based on this conclusion, we recommend that the designated uses and criteria identified in 20.6.4.97 NMAC be applied to this stream reach in accordance with the UAA process set forth in Subsection C of 20.6.4.15 NMAC.

Submitted by:

Signed: _____ Date: _____

Surface Water Quality Bureau concurs with recommendation. ☐ Yes ☐ No

If no, see attached reasons.

Signed: _____ Date: _____

EPA Region 6 technical approval granted. ☐ Yes ☐ No

If no, see attached reasons.

Signed: _____ Date: _____

Attachment 3

NMED Comments with SFO/NTESS Responses

NMED Comments and SFO/NTESS Responses

NMED Comment #1: General comment: This UAA work plan appears to be inclusive of the elements that the department incorporates into its own HP UAA work plans. In revising the work plan and drafting the UAA document, SNL is encouraged to review past HP UAAs posted on the bureau's website for elements that make for a successful HP UAA, and reference EPA guidance on the general structure of the UAA. The work plan should not presuppose the conclusion of the UAA.

Response to Comment #1: DOE and NTESS agree with the comment. Past HP UAA's available on the NMED website have been reviewed, EPA guidance is referenced in the work plan, and all presupposition of stream conditions have been removed from the workplan.

NMED Comment #2: General comment: "beneficial uses" and "designated uses" are interchanged throughout this document. For the purpose of this investigation, it is recommended that "designated uses" be applied since *designated use* is defined in the State's water quality standards (20.6.4.7 NMAC) and "beneficial uses" are typically associated with water rights.

Response to Comment #2: DOE and NTESS agree with this comment. The term "beneficial use" has been replaced with "designated use" throughout the work plan.

NMED Comment #3: Substantial elements of the UAA in support of proper hydrologic determination can and should be done prior to field work. This should include, but is not limited to, the aerial photographs/and or satellite imagery noted in section 3.2, page 7. Representative satellite imagery across several years or decades (if available) for the proposed HP field sites should be included as an appendix to the UAAwith any identifying features noted.

Response to Comment #3: DOE and NTESS agree with this comment. We will begin compiling the existing information listed in Section 3.2 of the work plan prior to conducting the field portion of the HP UAA. Satellite imagery from numerous years dating back to 1935 will be used to assess changes to the stream over time.

NMED Comment #4: In the introduction, it is noted that the HP UAA is the tool employed to change the designated flow regime of a water of the US/State. To clarify, a UAA is a scientific study designed to assess the factors affecting the attainment of a use (in this case 101(a)(2) uses, a.k.a. "fishable-swimmable" uses, or aquatic life and contact uses). The HP is a methodology for distinguishing between ephemeral, intermittent, and perennial waters in New Mexico, generates documentation of the uses supported by those waters as a result of the flow regime, and provides technical support for theUAA.

Response to Comment #4: DOE and NTESS agree with this comment. The work plan has been modified to provide clarity.

NMED Comment #5: In Section 2, "Background" of the draft work plan, the AU comments in the §303(d)/§305(b) Integrated Report (IR) for Tijeras Arroyo (Rio Grande to Four Hills Bridge) identify the water type as "ephemeral" but specify the designated uses/criteria as

intermittent (i.e., 20.6.4.98 NMAC). Pursuant to 20.6.4.11 H NMAC, "[a]n unclassified surface water of the state is... subject to 20.6.4.98 NMAC if nonperennial or subject to 20.6.4.99 NMAC if perennial." A waterbody may be classified as ephemeral under 20.6.4.97 NMAC only if a UAA demonstrates that attainment of Section 101(a)(2) uses is not feasible. The AU comments provided in the IR are based on preliminary data or best professional judgement, and are used to identify data needs that are essential for management decisions (e.g., to provide technical support for a UAA and hydrologic determination).

Response to Comment #5: DOE and NTESS agree with this comment.

NMED Comment #6: In section 2.1 "stream classifications", the reference to the New Mexico Administrative Code "NMAC" for intermittent and ephemeral waters appear to be inadvertently switched. *i.e.*, Intermittent water bodies are 20.6.4.98, etc.

Response to Comment #6: DOE and NTESS agree with this comment. The references have been corrected.

NMED Comment #7: Section 2.2 "Use Attainability Assessment". SNL's proposed workplan states that a "UAA is a scientific study conducted for assessing if a given water body supports a particular beneficial use". In accordance with 20.6.4.15.A NMAC, a use attainability analysis is a scientific study conducted for the purpose of assessing the factors affecting the attainment of a use. In recounting 40 CFR § 131.1O(g) factors, it is advisable to identify which of the six factors, based on extant data, is believed to apply.

Response to Comment #7: DOE and NTESS agree with the comment. The work plan has been edited to provide clarity. The factors listed in 40 CFR 131.10(g) that are most likely to apply to this UAA are identified in Section 2.2 of the work plan as factors 2 and 5.

NMED Comment #8: While the HP-UAA guidance notes that a Level 1 determination, dependent on scoring may prove to be sufficient, and that the Level 1 HP could conceivably cease based on scoring after indicator number 1.6, the department strongly encourages the HP field data collection team to collect as many indicators as possible (1.1 through 1.14) in support of the highest attainable use determination, especially given the potential anthropogenic influences in this watershed.

Response to Comment #8: DOE and NTESS agree with this comment. Regardless of the score obtained for indicators 1.1 through 1.6, indicators 1.1 through 1.14 will be evaluated in order to provide the most thorough assessment possible.

NMED Comment #9: Wherein questions occur in the field regarding certain indicators, NMED recommends representatives from the SNL collaborate in the field with SWQB to assure proper HP implementation and concurrence on scoring.

Response to Comment #9: DOE and NTESS agree with this comment. DOE and NTESS appreciate any assistance that NMED is willing to provide. Representatives from NMED will provide input and be present during field activities and will serve in an advisory capacity rather than an oversight role. DOE and NTESS will serve as project managers and will be responsible

for ensuring the HP is conducted according to this work plan and applicable regulations. HP indicator scores will be developed through consultation with NMED with the goal of reaching a consensus. A final determination will be made by DOE and NTESS. All work will be conducted under the DOE and NTESS health and safety program.

NMED Comment #10: When obtaining new photographic data associated with the HP work such as upstream and downstream aspects, a description of the photo metadata recording and interpretation is necessary. There are several guidance documents on the proper recording of photographic evidence including the United States Department of Agriculture/Forest Service Photo Point Monitoring Handbook, Part A-Field Procedures (General Technical Report PNW-GTR-526, 200i [1]). This handbook is an acceptable resource for photographic data collection. NMED also recommends recording the Standard Precipitation Index for the period associated with any imagery.

Response to Comment #10: DOE and NTESS agree with this comment. Photo Documentation will be conducted at each transect location, including upstream and downstream aspects, according to the methods described in the United States Department of Agriculture/Forest Service Photo Point Monitoring Handbook, Part A- Field Procedures (General Technical Report PNW-GTR-526, 2002).

NMED Comment #11: In Section 3.2 "Compilation of Existing Data": In addition to those existing data sources listed in this section, it would enhance the characterization of the natural hydrology within Tijeras Arroyo if there was the inclusion of the associated geologic and soil characteristics within the watershed.

Response to Comment #11: DOE and NTESS agree with this comment. Geologic maps from the United States Geologic Survey (USGS) and soil maps from the National Resources Conservation Society (NRCS) will be used to describe the local geologic formations and soil types found within the study area. An overview of the geologic setting and history of the area will be provided in the final report.

NMED Comment #12: Section 3.2, "Existing Data-Flow data": This section notes that there is almost 10 years of USGS gage height data (USGS gauging station 08330600), but there also appears that the USGS discharge data at the same site spans 20 years (-1996-Present). The SWQB suggests SNL consider this discharge data for the purposes of this HP UAA, if there is reason to disregard this data set please indicate the reasoning.

Response to Comment #12: DOE and NTESS agree with this comment. All available flow data from USGS gauging station 08330600 will be used.

NMED Comment #13: Section 3.2, "Existing Data-Meteorological data": The Standardized Precipitation Index (SPI) from the National Drought Mitigation Center (NDMC, l 995) is the recommended index for HP investigations. The SPI provides informative background on drought conditions for the period to which data is collected. Ideally, the data collection would occur under a normal precipitation regime however, falling outside the normal precipitation index does not necessarily preclude collection of HP data but would provide the necessary information to

determine the veracity of the hydrology protocol findings. The SWQB encourages the identification and application of other standard precipitation indices (SPEI, for instance) in addition to the SPI, as they may strengthen the establishment of precipitation conditions (a weight of evidence approach).

Response to Comment #13: DOE and NTESS agree with this comment. The SPI from the NDMC will be the primary assessment tool to evaluate drought conditions. For comparison, site-specific climate data will be used to calculate SPI and compare it to the NDMC value. The Palmer Drought Severity Index (PDSI) will also be used to evaluate relative drought conditions.

NMED Comment #14: Section 3.2 "Existing Data": As detailed in 20.6.4.15B NMAC, a use attainability analysis shall assess the physical, chemical, biological, economic or other factors affecting the attainment of a use. This should include identification and characterization of groundwater wells, permitted discharges (as already identified in the work plan), and any water diversions (currently lacking in the work plan) and how they may impact the natural hydrology of Tijeras Arroyo. A ground water contour map, if available, would be helpful in identifying depth to ground water (see definition of "ephemeral' in 20.6.4.7 NMAC) and ground water flow paths to establish the surface water/ground water relationship.

Response to Comment #14: DOE and NTESS agree with this comment. Section 3.2 of the work plan has been updated to specify that groundwater contour maps will be provided, and that all water diversions will be cataloged.

NMED Comment #15: Section 3.3 "Collection of New Data" Table 2: Please include approximate latitude and longitude geospatial data for this table.

Response to Comment #15: Table 2 has been expanded to include the latitude and longitude of each transect location. The assessment locations and coordinates were determined using GIS software. The transect locations in the work plan may be adjusted in the field as conditions dictate to improve exact assessment locations or to maintain safety of field personnel.

NMED Comment #16: Section 3.3 "Collection of New Data": It is suggested that SNL remove suppositions from the text of the collected data parameters *(e.g.,* "flow is not expected"; "aquatic life is not expected to be encountered").

Response to Comment #16: DOE and NTESS agree with this comment. All presuppositions have been removed from the work plan.

NMED Comment #17: Section 4 "Provision for Public Notice and Consultation with Government Agencies": The proper NMAC reference for UAAs is 20.6.4 NMAC, not 20.6.2.4 NMAC. For clarity, NMED recommends that the following paragraphs replace, "A 30-day public review and comment period will be provided once it has been submitted to NMED for review and approval":

Upon completion of fieldwork, SNL will draft and submit the HP UAA to

NMED for review. If the UAA demonstrates to the satisfaction of NMED that fishable- swimmable uses are not attainable in the water body of interest, the process described in Subsection C *of 20.6.4.15 NMAC will be followed. Accordingly, SNL will conduct a 30-day public review and comment period. NMED will post the UAA on its website and notify interested parties of the 30-day public comment period. After reviewing any comments received, SNL will submit the final draft UAA, including a response to comments, to NMED for review and concurrence. NMED will submit the final draft UAA and response to comments to EPA Region 6 for technical approval. If technical approval is granted, the water will be subject to 20.6.4.97 NMAC. NMED will petition the Water Quality Control Commission (WQCC) to list ephemeral waters identified through an HP UAA under Subsection C of 20.6.4.97 NMAC during the next triennial review of water quality standards.*

If NMED does not concur with the conclusions of the UAA, the third-party UAA process described in Subsection D of 20.6.4.15 NMAC will be followed. Under this subsection, SNL would petition the WQCC for a regular UAA hearing to modify the water quality standards.

Response to Comment #17: DOE and NTESS agree with this comment. The language provided above has been included in the work plan and the citation has been corrected. After adding this language, Sections 4 and 5 were re-ordered.

NMED Comment #18: Section 5 "Reporting" Section: The word "photo" is misspelled.

Response to Comment #18: The typo has been corrected.

NTESS Exhibit 6

Sandia National Laboratories

Work Plan: Use Attainability Analysis for Tijeras Arroyo (Rio Grande to Four Hills Bridge Reach, Assessment Unit ID NM-9000.1_070)

John T. Kay

January 2023

SAND2022 14210 O

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

CONTENTS

1. Introduction 4
2. Background 5
   2.1. Water Quality Standards, Designated Uses, and Stream Classifications 5
   2.2. Use Attainability Assessment 6
3. Scope of Work 8
   3.1. Project Personnel 8
   3.2. Compilation of Existing Data 9
   3.3. Stream Surveys 10
4. Reporting 13
5. Provisions for Public Notice and Consultation with Government Agencies 13

LIST OF TABLES

Table 1. Primary UAA team members 8
Table 2. Hydrology protocol survey locations 12
Table 3. Proposed public involvement process 13

ACRONYMS AND DEFINITIONS

Acronym	Definition
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
GIS	geographic information system
GPS	global positioning system
HUC	hydrologic unit code
KAFB	Kirtland Air Force Base
NMED	New Mexico Environment Department
NTESS	National Technology & Engineering Solutions of Sandia
SNL/NM	Sandia National Laboratories, New Mexico
SPI	Standardized Precipitation Index
UAA	use attainability analysis
WQCC	Water Quality Control Commission
WQMP/CPP	Water Quality Management Plan and Continuing Planning Process

1. INTRODUCTION

National Technology & Engineering Solutions of Sandia (NTESS) and the U.S. Department of Energy (DOE) National Nuclear Security Administration Sandia Field Office prepared this work plan to conduct a use attainability analysis (UAA) for a portion of the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach, AU ID NM-9000.A_070). This reach of the Tijeras Arroyo receives stormwater discharged from Sandia National Laboratories, New Mexico (SNL/NM).

A UAA is a scientific study conducted for the purpose of assessing the factors affecting the attainment of a designated use. The U.S. Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) require a UAA to support the determination that a designated use is not attainable for a Water of the United States or a Water of the State of New Mexico. A UAA involves collecting hydrological, geomorphic, and biological stream characteristics data through geographic information system (GIS) mapping; reviewing existing information; completing field surveys; and preparing a report describing which designated uses are supported by the findings. Results are compiled in a report and submitted to NMED and ultimately to EPA for review and approval.

This work plan describes data and methods that will be used to prepare this UAA. In accordance with the guidelines provided in Title 20, Chapter 6, Part 2, Section 4 of the New Mexico Administrative Code (20.6.2.4 NMAC), *Ground and Surface Water Protection*, this work plan describes existing information that will be used for the UAA, new data that will be generated during the UAA, factors affecting use attainment that will be analyzed, and provisions for public notice and consultation with government agencies.

2. BACKGROUND

The headwaters of the Tijeras Arroyo are located in Tijeras Canyon and the foothills of the Sandia and Manzano mountains east of Kirtland Airforce Base (KAFB). The Tijeras Arroyo flows from east to west and terminates where it discharges to the Rio Grande. The total length of the Tijeras Arroyo is approximately 27.5 miles. For regulatory purposes, NMED divides the Tijeras Arroyo into two separate assessment units: Rio Grande to Four Hills Bridge (AU ID NM-9000.A_070) and Four Hills Bridge to Headwater (AU NM-9000.A_001).

SNL/NM discharges stormwater to the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach, NM-9000.A_070). The reach is currently designated as intermittent. Based on years of observation, monitoring, and data collection within and near Tijeras Arroyo, NTESS and DOE believe that the reach is ephemeral rather than intermittent. NTESS and DOE propose conducting this UAA in order to identify the appropriate regulation for stormwater discharges from SNL/NM.

2.1. Water Quality Standards, Designated Uses, and Stream Classifications

In New Mexico, water quality standards are based upon the designated uses of a water body. NMED assigns designated uses (which are approved by EPA) with consideration for the water body's flow regime (perennial, intermittent, or ephemeral); therefore, water quality standards are largely a function of whether the water body is perennial, intermittent, or ephemeral.

Intermittent waters have more stringent water quality standards than ephemeral waters. This is due to the types of aquatic life that intermittent waters support, as well as their recreational and economic uses. The terms intermittent and ephemeral are defined as follows in 20.6.4.7 NMAC, *Standards for Interstate and Intrastate Surface Waters*:

- *Intermittent:* when used to describe a surface water of the state means the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow
- *Ephemeral:* when used to describe a surface water of the state means the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region

The uses designated for intermittent water bodies (20.6.4.98 NMAC) and their definitions (20.6.4.7 NMAC) are:

- *livestock watering:* use of a surface water for consumption by livestock
- *wildlife habitat:* surface water used by plants or animals not considered as pathogens, or vectors for pathogens, or intermediate hosts for pathogens for humans or domesticated livestock and plants
- *marginal warmwater aquatic life:* natural habitat conditions severely limit the ability of the surface water to sustain a natural aquatic life population on a continuous basis
- *primary contact:* any recreational or other water use in which there is prolonged or intimate human contact with water, such as swimming and water skiing, involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, or any use of the surface water for cultural, religious, or ceremonial purposes in which there is intimate human contact with the water

The uses designated for ephemeral water bodies (20.6.4.97 NMAC) are:

- *livestock watering:* use of a surface water for consumption by livestock
- *wildlife habitat:* surface water used by plants or animals not considered as pathogens, or vectors for pathogens, or intermediate hosts for pathogens for humans or domesticated livestock and plants
- *limited aquatic life:* the surface water is capable of supporting only a limited community of aquatic life
- *secondary contact:* a water in which recreational contact may occur, and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, boating, and limited seasonal contact

In New Mexico, non-perennial waters (intermittent and ephemeral) are regulated by default under 20.6.4.98 NMAC unless a UAA has been conducted and indicates that a specific water should be classified under 20.6.4.97 NMAC. In other words, NMED presumes that all waters can support the uses listed under 20.6.4.98 NMAC unless a UAA demonstrates otherwise.

2.2. Use Attainability Assessment

A UAA is a scientific study conducted for the purpose of assessing the factors affecting the attainment of a designated use. A UAA must be conducted before a designated use can be removed or changed to a category requiring less stringent criteria, and it must demonstrate that attainment of the use is not feasible based on at least one of the factors identified in 40 CFR 131.10(g), *Water Quality Standards*:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; *or*
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; *or*
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; *or*
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; *or*
5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; *or*
6. Controls more stringent than those required by sections 301(b) and 306 [technology-based effluent limitations] of the Act would result in substantial and widespread economic and social impact.

Of particular relevance to the Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo are factors 2 and 5, which will likely be the factors that determine whether the water is intermittent or ephemeral. Our current state of understanding is that flow in Tijeras Arroyo (Rio Grande to Four Hills Bridge reach, AU ID NM 9000.A_070) occurs infrequently and only in direct response to precipitation events. For this reason, this analysis will focus largely on the occurrence of water and flow and how it limits the reach's ability to support "marginal warmwater aquatic life" and "primary contact" designated uses.

According to input received from NMED, the EPA will not make a determination unless the Water Quality Control Commission (WQCC) has issued a ruling first. Therefore, the expedited process using the hydrology protocol described in 20.6.4.15(C) cannot be used. Instead, SNL/NM will conduct the UAA according to the process described under 20.6.4.15(D) NMAC rather than the process described in 20.6.4.15(C).

3. SCOPE OF WORK

This scope of work is guided by requirements listed in Subsection D of 20.6.4.15 NMAC and the NMED *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process*. DOE and NTESS will rely on both existing data and newly generated data to compile the UAA.

The study area will include the Tijeras Arroyo (Rio Grande to Four Hills Bridge reach, AU ID NM-9000.A_070) and the surrounding area having the potential to impact flows within the reach. The 10-digit hydrologic unit code (HUC 10) watershed boundary (Tijeras Arroyo) that encompasses this area is shown in Figure 1. The HUC 12 watershed boundaries (Upper Tijeras Arroyo, Middle Tijeras Arroyo, and Lower Tijeras Arroyo) that contribute flow to this reach are shown in Figure 2.

3.1. Project Personnel

A multidisciplinary staff of environmental professionals—including geologists, hydrologists, water quality specialists, biologists, ecologists, meteorologists, geographers, GIS analysts, and field technicians—will be used to compile the UAA.

Stormwater Program personnel will lead the project team for this work. The primary UAA team members are listed in Table 1; additional expertise will be leveraged as needed.

Table 1. Primary UAA team members

Team Member	SNL/NM Program	Primary UAA Role	Degree/Certification
John Kay	Stormwater	Project lead Geology Stream flow Water quality	• MS, hydrology, • Professional geologist (California)
Kathie Deal	Stormwater	Regulatory review	• MS, environmental science
Joe Fontana	Meteorology	Climate and precipitation	• MS, atmospheric sciences
Jennifer Payne	Ecology	Vegetation and aquatic life	• MS, water resources management • BS, biology • Certified Ecological Restoration Practitioner (Society for Ecological Restoration)
Mike Skelly	Groundwater	Groundwater	• MS, geology • Professional geologist (Wyoming)
Sonny Casaus	GIS	Geographic data and maps	• GIS certified professional
Steven Toler	Surveyor	Stream channel surveys	• BS, civil engineering • Registered professional land surveyor (New Mexico)

3.2. Compilation of Existing Data

Existing sources of information will be compiled to generate a comprehensive picture of the hydrologic setting and conditions in the vicinity of Tijeras Arroyo. GIS-based mapping will be used to analyze and produce aerial photos, topographic maps, surface water drainage maps, geologic and soil maps, ecoregion maps, groundwater wells, and vegetation maps. Existing site-specific SNL/NM groundwater, surface water, and climate data will be presented. Additionally, existing U.S. Geological Survey surface water data and meteorological data will be presented.

Aerial photos will be used to show the study area, in particular any impoundments, riparian (streamside) vegetation, and the presence or absence of water in the channel. Aerial photos will also be used to show the location of surveys conducted as part of the hydrology protocol and to calculate stream channel tortuosity.

Topographic maps will be used to show elevation breaks and channel constraints that could indicate a change in hydrology. The topographic maps will also show drainage basin boundaries, tributaries, and other features that impact surface flow to or from the Tijeras Arroyo. National Hydrography Dataset or equivalent quality shapefiles will be used to show the location of stream channels on location maps.

Geologic and soil maps will be used to describe the local geologic formations and soil types found within the study area. An overview of the geologic setting and history of the area will be provided. The geology and soils will be discussed relevant to their influence on local hydrology and the occurrence of flow within Tijeras Arroyo.

Ecoregion maps will be used to show large geographic areas that represent ecosystem variations. An ecoregion is characterized by a certain elevation, air temperature, precipitation, terrain, geology, soils, vegetation, and fauna. Ecoregion breaks indicate a significant change in landscape-wide characteristics, including hydrology, that may support interpretations of where changes in stream flow type (e.g., intermittent or ephemeral) occur.

Groundwater wells and surface diversions recorded with the New Mexico Office of the State Engineer will be mapped in relation to the Tijeras Arroyo. Groundwater and surface water diversions recorded with the New Mexico Office of the State Engineer will be reviewed for possible effects on surface flow in the water body. Extensive groundwater monitoring at KAFB will provide ample data to determine any potential groundwater influences on surface flow within Tijeras Arroyo.

Permitted discharges National Pollutant Discharge Elimination System permits will be identified and mapped to evaluate effects on flow. There are several stormwater outfalls within the study area.

Surface water data from a U.S. Geological Survey stream gauge (Gauge 08330600, TIJERAS ARROYO NR ALBUQUERQUE, NM) will be used to document frequency of flow in the study reach. Nearly 20 years of data are available for this gauge, starting in 1996. Flow data will be compared to precipitation data from various rain gauge locations upstream in the drainage basin.

Meteorological data will be reviewed to ensure that extreme drought conditions or precipitation events do not bias the field results. Drought conditions will be appraised using the 12-month Standardized Precipitation Index (SPI). The SPI from the National Drought Mitigation Center will be used, as well as an SPI calculated from on-site meteorological data. An index value of zero indicates the

median precipitation. A negative index value indicates below normal precipitation, and less than −1.5 is considered drought conditions. Field surveys (using the hydrology protocol) will not be conducted when the SPI is less than −1.5.

3.3. Stream Surveys

The expedited process for which the hydrology protocol was developed as described in 20.6.4.15(C) will not be followed as explained above in Section 2.2. Instead, the hydrology protocol field survey method will be used to support the UAA; this provides a good method for characterizing stream channel conditions. The hydrology protocol is described in detail in *Hydrology Protocol for the Determination of Uses Supported by Ephemeral, Intermittent, and Perennial Waters* (Appendix C of *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process*). A brief summary is provided here.

Field survey sheet questions are used to evaluate the hydrological, geomorphic, and biological indicators of the persistence of water. A scoring system enables the user to evaluate which aquatic life and contact uses are supported by the water body, and, therefore, whether the water is intermittent or perennial. The hydrology protocol is organized into Level 1 and Level 2 evaluations. The Level 1 evaluation consists of 14 indicators (1.1 through 1.14). The hydrology protocol instructs the user that a total score of less than 2 on indicators 1.1 through 1.6 indicates "the reach is determined to be perennial; you can stop the evaluation." DOE and NTESS will, however, accept the NMED recommendation that indicators 1.1 through 1.14 be evaluated regardless of the score obtained from indicators 1.1. through 1.6 in order to provide the most thorough evaluation possible. Data gathered during the Level 1 evaluation are usually adequate to indicate the hydrological status of the stream. If the Level 1 evaluation is inconclusive, a Level 2 evaluation may be conducted.

Representatives from NMED will be present during some of the surveys, serving in an observatory capacity rather than an oversight role. DOE and NTESS will be responsible for ensuring that the hydrology protocol is conducted according to this work plan and applicable regulations. Hydrology protocol indicator scores will be developed through consultation with NMED with the goal of reaching a consensus. If consensus is not reached DOE and NTESS will make the final determination for inclusion in the UAA. All work will be conducted under the NTESS health and safety program.

The following items will be characterized at each survey location (survey stream locations are shown in Table 2):

- *Photo documentation* will be conducted at each transect location, including upstream and downstream aspects, according to the methods described in the U.S. Department of Agriculture Forest Service *Photo Point Monitoring Handbook: Part A—Field Procedures* (PNW-GTR-526, 2002).
- *Climate and weather* will be summarized. Long-term climatic conditions within the study area will be described, particularly precipitation patterns and amounts. The weather at the time of field surveys will be documented. NTESS meteorologists will compute the SPI using on-site data; if the SPI is less than −1.5, the hydrology protocol will be postponed until sufficient rainfall occurs to raise the SPI above −1.5.
- *Stream modifications and anthropogenic impacts* will be evaluated using historical aerial photography to identify any major changes to the natural stream channel that have occurred over time. Any man-made structures, channel stabilization, or other activities evident during field surveys will be documented.

- *Flow* in the stream channel or the presence of any standing water will be documented. Evidence of recent high waters will be documented. The presence of pools of water and saturated sediment will be documented.
- *Aquatic life* will be surveyed and documented.
- *Benthic macroinvertebrates* will be documented by searching under rocks, root wads, undercut banks, leaf packs, and any other locations that may provide a cool and damp environment. The sandy channel margins will be searched for mussel and aquatic snail shells and caddisfly casings.
- *Algae and periphyton* will be documented by looking for a film or hair-like growth on rocks within the stream channel; it is not anticipated that these exist within the reach.
- *Stream channel sinuosity* will be measured using GIS between adjacent transect locations and for the entire reach. Sinuosity will also be described during field surveys; some portions of the reach are more sinuous than others, and the reasons for this will be investigated.
- *Differences in upland vegetation and vegetation in the stream channel* and adjacent areas will be described. The type and density of vegetation in the channel and on adjacent upland areas will be documented at each transect. If upland vegetation is absent in the stream channel this will be noted.
- *Floodplain and channel dimensions* will be surveyed across the reach's entire width perpendicular to the direction of flow. Stream channel surveys will be conducted on 2-foot intervals, using a construction-quality survey level and rod. The surveys will not be tied to known benchmarks, but elevations will be estimated to within plus or minus several feet using a handheld global positioning system (GPS) unit. The floodplains on either side of the active stream channel will not be surveyed on 2-foot intervals, but the width of the flood plain will be measured using GIS tools and documented in the UAA.
- *In-channel structure* will be documented; riffle-pool sequences that can be discerned from the dry channel will be described.
- *Particle size of streambed substrate* will be characterized using a sand gauge reference card or wire screen method. Particle size will also be characterized for an adjacent upland area for comparison with the streambed.
- *Hydric soils* will be documented within the stream bank. Field guides published by the National Resources Conservation Service will be used to identify hydric soils.
- *Sediment deposition* on plants or debris within the channel will be documented. Upstream sources of anthropogenic sediment will be considered when describing the source and transport of any sediment deposits observed.
- *Seeps and springs* are not known to exist within the reach but will be documented if encountered.
- *Iron-oxidizing bacteria and fungi* will be noted if present. If present, these will present themselves as orange or brown discoloring of rocks and sediments.

Field surveys will utilize the hydrology protocol process developed by NMED to inform the findings and conclusions of this UAA because it is an established method. However, SNL/NM will conduct the UAA according to the process described under 20.6.4.15(D) NMAC rather than the hydrology protocol process described in 20.6.4.15(C)

All field data will be recorded on the NMED *Hydrology Determination Field Sheet* as well as in field notebooks and other record sheets as needed.

Table 2. Hydrology protocol survey locations

Survey Location Number	Location Description	Latitude	Longitude	Property Ownership
1	Immediately downstream from I-25	35.0009	−106.6534	Albuquerque Metropolitan Arroyo Flood Control
2	Downstream boundary of Montessa Park	35.0121	−106.6258	Bernalillo County
3	Upstream boundary of Montessa Park	35.02060	−106.5985	Bernalillo County
4	KAFB south of the 6100 Igloos	35.03013	−106.5770	U.S. Department of Defense
5	KAFB south of the wooden trestle	35.02567	−106.5579	U.S. Department of Defense
6	KAFB near Pennsylvania Avenue Bridge	35.02743	−106.5394	U.S. Department of Defense
7	Upstream boundary of KAFB	35.0411	−106.5308	U.S. Department of Defense
8	Downstream from Juan Tabo Road Bridge	35.0568	−106.51097	City of Albuquerque
9	Immediately downstream from Four Hills Bridge	35.0602	−106.4916	City of Albuquerque

4. REPORTING

The completed UAA will be submitted to NMED for review according to the process described in 20.6.4.15(D) NMAC. Figures and maps will be included. Attachments to the UAA will provide data tables, stream survey profiles, and photo documentation of stream conditions.

5. PROVISIONS FOR PUBLIC NOTICE AND CONSULTATION WITH GOVERNMENT AGENCIES

The process for agency, stakeholder, and public involvement follows the requirements and processes described in 20.6.4 NMAC; 20.1.6 NMAC, *Rulemaking Procedures-Water Quality Control Commission*; the *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process*; 40 CFR 131; and 40 CFR 25.4, *Public Participation in Programs under the Resource Conservation and Recovery Act, the Safe Drinking Act, and the Clean Water Act*. The process will follow the steps outlined in Table 3.

NTESS and DOE will work closely with NMED to ensure that all activities are conducted to NMED satisfaction.

Table 3. Proposed public involvement process

Item Number	Activity	Timeline	Requirement or Guidance
1	Submit UAA to Surface Water Quality Bureau for review	Following completion of the UAA	• 20.6.4.15.D NMAC
2	Hold informal stakeholder meetings	Ongoing	• *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process* (WQMP/CPP)
3	Hold 60-day public comment period for UAA	coordinated with NMED following UAA submittal	• 40 CFR 131.20 • WQMP/CPP
4	Hold a public meeting	Approximately 30 days after the start of the public comment period	• 40 CFR 25.6 • WQMP/CPP
5	Respond to comments (EPA, SWQB, and public) and revise UAA	Within 30 days of the end of the public comment period	• WQMP/CPP
6	Petition WQCC to be placed on the agenda to request a public hearing with a proposed date for such hearing	Within 60 days of the end of the public comment period, after responding to comments	• 40 CFR 131.20 • 20.1.6.200 NMAC • NM WQA 74-6-6.A NMSA 1978 • WQMP/CPP

Item Number	Activity	Timeline	Requirement or Guidance
7	Publish the hearing notice published in the New Mexico Register	At least 60 days prior to the hearing	• 20.1.6.201 NMAC • NM WQA 74-6-6 NMSA 1978 • WQMP/CPP
8	Send the hearing notice to other interested parties	At least 60 days prior to the hearing	• 20.1.6.201 NMAC • NM WQA 74-6-6 NMSA 1978
9	File a Notice of Intent to testify and prepare written testimony and exhibits	At least 20 days before the hearing	• 20.1.6.203 NMAC • NM WQA 74-6-6.D NMSA 1978
10	Have a hearing with oral testimony, presentation of exhibits, and cross-examination	Day of the hearing	• 20.1.6.300-302 NMAC • NM WQA 74-6-6.A NMSA 1978 • WQMP/CPP
11	Receive the WQCC deliberation and decision of the proposed rule	Up to 60 days following the hearing	• 20.1.6.306 NMAC • NM WQA 74-6-4.E NMSA 1978 • WQMP/CPP

REFERENCES

[1] 20.1.6 NMAC, *Rulemaking Procedures-Water Quality Control Commission*

[2] 20.6.2, *Ground and Surface Water Protection*

[3] 20.6.4 NMAC, *Standards for Interstate and Intrastate Surface Waters*

[4] 40 CFR 25.4, *Public Participation in Programs under the Resource Conservation and Recovery Act, the Safe Drinking Act, and the Clean Water Act*

[5] 40 CFR 131, *Water Quality Standards*

[6] NMED *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process*

[7] *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process*

[8] U.S. Department of Agriculture Forest Service *Photo Point Monitoring Handbook: Part A—Field Procedures* (PNW-GTR-526, 2002)

NTESS Exhibit 7

TIJERAS ARROYO UAA PUBLIC MEETING

NEW MEXICO VETERANS MEMORIAL

Wednesday March 5, 2025

IF YOU'D LIKE TO BE ADDED TO OUR DISTRIBUTION LIST, PLEASE ADD YOUR EMAIL OR MAILING ADDRESS. THANK YOU!		
NAME:	**EMAIL ADDRESS**	**MAILING ADDRESS** (Include City/State/Zip)
Anita Reiser	asreise@sandia.gov	Box 5800 MS 730 ABQ NM 87185-0730
Serafina Selija	Serafina.Selija@gknet.com	
Tami Moore	tami.moore@nnsa.doe.gov	

IF YOU'D LIKE TO BE ADDED TO OUR DISTRIBUTION LIST, PLEASE ADD YOUR EMAIL OR MAILING ADDRESS. THANK YOU!		
NAME:	**EMAIL ADDRESS**	**MAILING ADDRESS** (Include City/State/Zip)
Trent Johnson	trent.j.whitesand@gmail.com	6304 Camino Ocho
John Copland	jrcopla@sandia.gov	—
Michael Baca	michael.baca1@env.nm.gov	1190 St. Francis Dr. Santa Fe, New Mexico, 87505
Shannon Williams	shannon.williams@gmail.com	—
Ben Cortez	blcortez@hotmail.com	—
Dezbah Jesus	dezts@gmail.com	—

April 23, 2024

Sign in Sheet

NTESS Exhibit 8

Tijeras Arroyo Use Attainability Analysis

List of Stakeholders Notified of Public Comment Period

Albuquerque Metropolitan Area Flood Control Authority
Stormwater Quality Engineer
Patrick Chavez
pchavez@amafca.org

Amigos Bravos
Deputy Director
Rachel Conn
rconn@amigosbravos.org

Bernalillo County
Stormwater Program Compliance Manager
Kali Bronson
kbronson@bernco.gov

Bosque Ecosystem Monitoring Program
Board Chair
Steve Glass
jstvglass@gmail.com

City of Albuquerque
Storm Drainage Section Manager
Shellie Eaton
seaton@cabq.gov

Ciudad Soil and Water Conservation District
Board of Supervisors
Steve Glass
jstvglass@gmail.com

Friends of the Valle de Oro
President
Forest Graber
forest@friendsofvalledeoro.org

Kirtland Air Force Base
Water Quality Program Manager
Erica Hernandez
erica.hernandez.8@us.af.mil

Mesa Del Sol
Director of Operations
Jerome Gonzales
jerome@mesadelsolnm.com

Middle Rio Grande Conservancy District
Chief Operations Officer
Eric Zamora
ezamora@mrgcd.us

Mountain View Neighborhood Association
President
Genevieve Mitchel
mvnasso@gmail.com

The Nature Conservancy
NM State Director
Terry Sullivan
tsullivan@tnc.org

N.M. Department of Transportation
District 3 Administrator
Jenay Gallegos
nmdot-d3.qcc@dot.nm.gov

N.M. Environment Department
Water Quality Standards Coordinator
Michael Baca
michael.baca1@env.nm.gov

N.M. Interstate Stream Commission
Interstate Stream Commission Deputy Director
Michelle Hunter
michelle.hunter@ose.nm.gov

Pueblo of Isleta
Natural Resources Department Manager
Ramona Montoya
Ramona.montoya@isletapueblo.com

Tijeras Creek Watershed Initiative
Co-chair
Steve Glass
jstvglass@gmail.com

U. S. Army Corp of Engineers
Regulatory Project Manger
Michael Uitvlugt
michaelpuitvlugt@usace.army.mil

U.S. Bureau of Reclamation
Water Resources Management Division
Yvette McKenna
yrmckenna@usbr.gov

U.S. Geological Survey
Urban Stormwater Program- Albuquerque
Fletcher Brinkerhoff
fbrinker@usgs.gov

U.S. EPA Region 6
Water Quality Protection Section
Jasmine Diaz Lopes
diazlopez.jasmin@epa.gov

U.S. Fish and Wildlife Service
Albuquerque Office Supervisor
Shawn Sartorius
shawn_sartorius@fws.gov

Valle de Oro National Wildlife Refuge
Covered under US FWS

NTESS Exhibit 9

NOTICE OF PUBLIC COMMENT PERIOD FOR THE U.S. DEPARTMENT OF ENERGY AND NATIONAL TECHNOLOGY & ENGINEERING SOLUTIONS OF SANDIA, LLC'S RIO GRANDE TO FOUR HILLS BRIDGE REACH OF TIJERAS ARROYO USE ATTAINABILITY ANALYSIS

SAND2025-01228O

National Technology & Engineering Solutions of Sandia, LLC ("NTESS"), operator of Sandia National Laboratories, is considering a petition to the Water Quality Commission to redesignate Rio Grande to Four Hills Bridge reach of Tijeras Arroyo as ephemeral instead of intermittent. In support of such action, NTESS advises of the availability of the "Rio Grande to Four Hills Bridge reach of Tijeras Arroyo Use Attainability Analysis ("UAA")" for stakeholder, review, comment, and engagement. NTESS also announces a public stakeholder meeting where NTESS will take questions and collaboratively engage on public comments related to the UAA.

NTESS and the United States Department of Energy ("DOE")/National Nuclear Security Administration/Sandia Filed Office, conducted a UAA for the Rio Grande to Four Hills Reach of Tijeras Arroyo (AU NM-9000.A_070). The purpose of conducting the UAA was to formally evaluate whether the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo exhibits characteristics of an ephemeral water body under 20.6.4.97 NMAC.

The Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo is currently treated as an intermittent stream with the designated uses of marginal warmwater aquatic life, primary human contact, livestock watering, and wildlife habitat for purposes of the Standards for Interstate and Intrastate Surface Waters ("SWQS"). A surface water of the state, even a dry arroyo, is treated as an intermittent water for purposes of SWQS unless a UAA is conducted showing that the water is properly classified as ephemeral. If so, then a UAA can provide a basis for the Water Quality Control Commission ("WQCC") to determine whether to list the water as ephemeral under 20.6.4.97 NMAC to properly reflect the hydrologically supported attainable uses of the water.

Environmental scientists at Sandia National Laboratories have studied this portion of Tijeras Arroyo to assess whether it has the characteristics of an ephemeral rather than intermittent stream. The results of these studies are reflected in the UAA Report completed in 2023 and previously submitted to the New Mexico Environment Department ("NMED") for review.

The UAA Report contains documentation supporting that the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo exhibits characteristics of an ephemeral water body. The UAA includes and assesses historic and recent hydrologic, geomorphic, and ecologic indicators of flow as well as results of field surveys using guidance from the NMED, known as the Hydrology Protocol method for differentiating ephemeral and intermittent water bodies based on the designated uses supported by a water. Based on the studies and historical documentation, the UAA concludes that the reach is ephemeral because it experiences flow for very brief periods of time, and only in response to direct storm runoff. Consequently, the identified reach of the Tijeras Arroyo does not support the beneficial uses associated with intermittent streams.

ACCESS TO THE USE ATTAINABILITY ANALYSIS
The UAA and additional documents may be reviewed electronically during the stakeholder engagement period in the following places:

Documents related to the UAA will be available online through the University of New Mexico Digital Repository website at https://digitalrepository.unm.edu/snl_tijeras_arroyo/.

Additional documents related to environmental compliance, monitoring, and stewardship are available through the Sandia National Labs, New Mexico, website at https://www.sandia.gov/about/environment/.

Additional documents may be available online or requested through the Department of Energy FOIA website at https://www.energy.gov/management/foia-reading-room or by emailing a request to envinfo@sandia.gov.

For other documents, please review the information available at the National Nuclear Security Administration Freedom of Information Act (FOIA) website at https://www.energy.gov/nnsa/freedom-information-act-foia.

Interested parties may also use any one or more of the following resources to keep informed about the UAA and environmental activities in general at Sandia National Labs, New Mexico:

- Follow Sandia National Labs, New Mexico, in the news,
- Attend semi-annual public meetings/poster sessions and permit-related public meetings/poster sessions, and
- Subscribe to mailing lists.

INFORMATION AND DEADLINE TO SUBMIT WRITTEN COMMENTS
This public notice is issued on February 8, 2025, to announce the beginning of a 60-day comment period that will end at 5:00 p.m. MDT, April 10, 2025. Any person who wishes to comment on the UAA should submit hardcopy or electronic comment(s) with the commenter's name and address using one of the methods provided below. Only comments and/or requests received on or before 5:00 p.m. MDT, April 10, 2025 will be considered.

Public comments can be made directly to NTESS and DOE via the SNL environmental website at https://www.sandia.gov/about/environment/, and via e-mail to envinfo@sandia.gov.

Public comments can be made directly to NMED via the public comment portal at https://nmed.commentinput.com/comment/search.

DATE AND LOCATION OF PUBLIC MEETING
Wednesday, March 5, 2025 from 6:00-7:00 PM

New Mexico Veterans Memorial
1100 Louisiana Blvd SE
Albuquerque, NM 87108

NTESS Exhibit 10

Tijeras Arroyo; Rio Grande to Four Hills Bridge Reach Use Attainability Analysis Public Involvement Plan

SANDIA NATIONAL LABORATORIES, NEW MEXICO

April 2024

United States Department of Energy National Nuclear Security Administration Sandia Field Office

Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND2024-05192O

Table of Contents

List of Tables and Figures 3

Acronyms And Abbreviations 4

1.0 Introduction 5

2.0 Background 5

3.0 Public Involvement Plan 6
3.1 NMED Surface Water Quality Bureau Oversight and Review of UAA 6
3.2 Conduct Informal Stakeholder Meetings 6
3.3 Hold 60-day Public Comment Period 7
3.4 Hold a Public Meeting 8
3.5 Respond to Comments and Revise UAA 8
3.6 Obtaining Information from NTESS and DOE 9
3.7 Providing Feedback to NTESS and DOE 9

4.0 WQCC Procedural Process 10

5.0 References 10

List of Tables and Figures

Tables **Page**

1 Public Involvement Process for Use Attainability Analyses……...11
2 Anticipated process conducted by WQCC……12

Figures **Page**

1 Location of Tijeras Arroyo Use Attainability Analysis……..…13

Acronyms And Abbreviations

DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
KAFB	Kirtland Air Force Base
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NTESS	National Technology & Engineering Solutions of Sandia, LLC
PIP	Public Involvement Plan
SFO	Sandia Field Office
SNL/NM	Sandia National Laboratories, New Mexico
UAA	Use Attainability Analysis
WQCC	New Mexico Water Quality Control Commission

1.0 Introduction

This public involvement plan (PIP) will guide notice to and consultation with stakeholders and the interested public to facilitate information sharing regarding a Use Attainability Analysis (UAA) that was conducted by SNL/NM for the Rio Grande to Four Hills Reach of Tijeras Arroyo completed in January 2023. The UAA will provide the basis for a proceeding before the New Mexico Water Quality Control Commission ("WQCC") to consider the classification of this reach of Tijeras Arroyo as an ephemeral water pursuant to the New Mexico Standards for Interstate and Intrastate Surface Waters (SWQS), particularly 20.6.4.97 NMAC.

The PIP was prepared by National Technology & Engineering Solutions of Sandia, LLC (NTESS) on behalf of the United States Department of Energy (DOE)/National Nuclear Security Administration (NNSA)/Sandia Field Office (SFO). NTESS is the management and operating contractor for Sandia National Laboratories, New Mexico (SNL/NM), and DOE/NNSA/SFO administers the SNL/NM contract. SNL/NM is located within the boundaries of Kirtland Air Force Base (KAFB), in Bernalillo County, New Mexico (Figure 1).

2.0 Background

The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) is currently identified in the State of New Mexico 303(d) List, by virtue of 20.6.4.98 NMAC, as an intermittent stream with the designated uses of marginal warmwater aquatic life, primary human contact, livestock watering, and wildlife habitat. Under the applicable rules, a surface water of the state, such as a dry arroyo, is treated as an intermittent water for purposes of designated uses under the SWQS unless a UAA is conducted showing that the water is properly classified as ephemeral. If so, then a UAA can provide a basis for the WQCC to list the water as ephemeral under 20.6.4.97 NMAC.

Environmental scientists at SNL/NM have observed this portion of Tijeras Arroyo to show characteristics of an ephemeral rather than intermittent stream. To formally evaluate if the stream meets the characteristics of an ephemeral water and to be classified as such pursuant to 20.6.4.97 NMAC, NTESS and DOE conducted a UAA. The UAA and associated documents are accessible to the public through the University of New Mexico Digital Repository:

https://menloservice.sandia.gov/https://digitalrepository.unm.edu/snl/

The UAA, prepared in 2023, contains the information showing that the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo exhibits characteristics of an ephemeral water body. This determination is supported by historic and recent hydrologic, geomorphic, and ecologic indicators of flow as presented in this report. It is also supported by results of field surveys using the New Mexico Environment Department ("NMED") Hydrology Protocol method for differentiating ephemeral and intermittent water bodies based on the designated uses supported by a water. The UAA concluded that the reach is ephemeral because it experiences flow for very brief periods only in response to direct storm runoff, and therefore cannot support the beneficial uses associated with intermittent streams. The highest attainable aquatic life and human contact uses were determined to be "limited aquatic life and secondary contact", and the current designated uses of "marginal warmwater aquatic life and primary contact" were determined to be not attainable.

NTESS and DOE intend to petition the WQCC for an amendment of the reach's classification based on its highest attainable use through the standard rulemaking process for entities other than NMED in accordance with 20.6.4.15(E) NMAC. The process for petitioning the WQCC includes requirements for public involvement in advance of the formal hearing process before the WQCC. This PIP describes how NTESS and DOE will fulfill those requirements, and also addresses the roles of NTESS/DOE, NMED, and the WQCC in the formal hearing process.

3.0 Public Involvement Plan

This Public Involvement Plan (PIP) describes the scope and implementation of public involvement required or recommended as part of the UAA process by the following regulatory references:

- 20.6.4 NMAC, *Standards for Interstate and Intrastate Surface Waters*;
- 20.1.6 NMAC, *Rulemaking Procedures-Water Quality Control Commission*;
- 40 CFR 131 *Water Quality Standards*; and
- 40 CFR 25.4, *Public Participation in Programs under the Resource Conservation and Recovery Act, the Safe Drinking Act, and the Clean Water Act*.
- The *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process*;

A summary of the requirements for public involvement is presented in Table 1: Summary of the public involvement process. Each step listed in Table 1 will is addressed separately Sections 3.1 through 3.11.

3.1 NMED Surface Water Quality Bureau Oversight and Review of UAA

The NMED Surface Water Quality Bureau (SWQB) approved the UAA Work Plan on March 8, 2023. NTESS and DOE submitted a draft UAA to SWQB on August 7, 2023. On October 10, 2023, SWQB indicated verbally during a conference call that the UAA addressed all aspects of the Work Plan and they had no additional comments on the UAA. During that conference call the SWQB agreed that the UAA was sufficient for NTESS and DOE to proceed toward petitioning the WQCC by initiating the public involvement process. The UAA and the approved Work Plan are available through the UNM Digital Repository here:

https://menloservice.sandia.gov/https://digitalrepository.unm.edu/snl/.

3.2 Conduct Informal Stakeholder Meetings

As an initial stage of the public involvement process, NTESS and DOE will schedule and conduct informal meetings with stakeholders in accordance with Section XIV (Public Participation) of the *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process.* Specifically, from Section XIV.B we will develop and maintain a stakeholder list of

affected/interested parties. In addition to the public and private entities that are listed below, NTESS will consult the SWQB database of affected/interested parties, which includes neighborhood associations, environmental organizations, the regulated community, watershed groups, and numerous individuals who sign up to receive information. Informal meetings will be held with key stakeholders identified in the list; all other stakeholders will be notified as described in Section 3.3 and given the opportunity to comment during the formal public comments period.

A preliminary (minimum) list of stakeholders that will be notified and provided an informal meeting includes:

- Pueblo of Isleta
- Kirtland Airforce Base
- Albuquerque Metropolitan Area Flood Control Authority
- Bernalillo County (Natural Resource Services; Open Space)
- City of Albuquerque (Open Space Division; Stormwater Section)
- Ciudad Soil and Water Conservation District
- Tijeras Creek Watershed Initiative
- The Nature Conservancy
- U.S. Geological Survey
- U.S. Fish and Wildlife Service
- U.S. EPA
- NM Department of Transportation (District 3)
- NM Environment Department

A letter will be mailed to each stakeholder group explaining our intention to petition WQCC to change the reach from intermittent to ephemeral and to request a meeting with them. During each meeting, the UAA findings will be presented. An opportunity for the stakeholder to ask questions and to present any concerns will be provided.

New or additional information obtained through informal stakeholder meetings that could impact the UAA will be used to re-evaluate the designated uses that are attainable within the reach. A summary of each meeting, any concerns expressed, and any pertinent additional information provided will be documented in an addendum to the UAA and made available to the general public through the UNM Digital Repository.

3.3 Hold 60-day Public Comment Period

NTESS will hold a 60-day public comment period following or concurrent with stakeholder meeting. Notice of the public comment period will be provided in writing to all identified stakeholders, and the general public will be notified through advertisement in the Albuquerque Journal and emails to the SWQB interested parties list. Additionally, NMED may choose to post notices on the SWQB website (https://www.env.nm.gov/surface-water-quality/).

Documents associate with the UAA will be available through the UNM Digital Repository at https://menloservice.sandia.gov/https://digitalrepository.unm.edu/snl/. Documents will include at a minimum:

- UAA Work Plan approved by SWQB
- Draft UAA submitted to SWQB

- Public Involvement Plan
- Public Notices used to advertise the public comment period
- List of stakeholders and mailing lists used to notify the public about the comment period
- Stakeholder and public comments on the UAA and written responses prepared by NTESS/DOE
- Other information regarding upcoming meetings, opportunities for public comments, hearing notices, etc.
- The UAA as revised by NTESS/DOE to reflect public comments

Public comments can be made directly to NTESS and DOE via the SNL environmental website at https://www.sandia.gov/about/environment/, and via e-mail to envinfo@sandia.gov.

Public comments can be made directly to NMED via the public comment portal at https://nmed.commentinput.com/comment/search.

3.4 Hold a Public Meeting

Approximately 30 days after the start of the public comment period a public meeting will be held. Per 40 CFR § 25.6, a public meeting can reduce notice to not less than 30 days. The meeting will be used to provide an overview of the UAA and allow the public to ask questions regarding the UAA. The date and location of the meeting will be determined prior to advertising the 60-day public comment period and will be included in the public noticing for the comment period. With concurrence from NMED, it is possible that the public meeting will be held on-line to facilitate and encourage attendance.

In accordance with 40 CFR § 25.5(b), the notice requirement for a public meeting states that the public meeting should be well publicized and mailed to appropriate portions of the list of interested/affected parties.

Per 40 CFR § 25.5(c), the meetings also must be held at times and places which, to the maximum extent feasible, facilitate attendance by the public. Accessibility of public transportation, and use of evening and weekend hearings, should be considered.

Furthermore, per 40 CFR § 25.6, public meetings are stated to be less formal than public hearings (no requirement for formal presentations, scheduling of presentations or a record of proceedings).

3.5 Respond to Comments and Revise UAA

Questions and statements provided during the 60-day public comment period, including the public meeting, will be documented, responded to, and provided to NMED. A compilation of stakeholder comments, and responses to them will be maintained on the UNM Digital repository and made available to the public. If multiple stakeholders provide the same or similar questions and comments, they may be consolidated in the compilation.

Comments that add new information or that may alter or enhance the UAA will be added to the UAA in an addendum, and if appropriately NTESS/DOE may revise the UAA as appropriate.

Responses and resulting revisions to the UAA will be made available on the UNM Digital Repository within 60 days of the public meeting and prior to filing a petition with the WQCC.

3.6 Obtaining Information from NTESS and DOE

Documents related to the UAA will be available online through the University of New Mexico Digital Repository http://digitalrepository.unm.edu/snl/.

Many additional documents related to environmental compliance, monitoring, and stewardship are available through the SNL/SM website https://www.sandia.gov/about/environment/.

Additional documents may be available online or requested through the DOE FOIA website https://www.energy.gov/management/foia-reading-room or by emailing a request to envinfo@sandia.gov.

For other documents, please review the information available at the National Nuclear Security Administration Freedom of Information Act (FOIA) website https://www.energy.gov/nnsa/freedom-information-act-foia.

Interested parties may also use any one or more of the following resources to keep informed about the UAA and environmental activities in general at SNL/NM:

- Follow SNL/NM in the news,
- Attend semi-annual public meetings/poster sessions and permit-related public meetings/poster sessions, and
- Subscribe to mailing lists.

3.7 Providing Feedback to NTESS and DOE

Public comments can be made directly to NMED via the public comment portal at https://nmed.commentinput.com/comment/search.

NTESS and DOE provide opportunities for public involvement at any time via the SNL environmental website at https://www.sandia.gov/about/environment/, and via e-mail to envinfo@sandia.gov. Interested persons are welcome to provide feedback at meetings and presentations, including:

- Semi-annual public meetings (presentations or poster sessions), held in April and October.
- Comment cards are available at in-person meetings. DOE and SNL personnel are available for questions and feedback, as time allows.

During online presentations, attendees are welcome to ask questions and make comments through the meeting chat feature. Attendees may also ask questions in advance by sending an email to envinfo@sandia.gov. The agendas and notices for online meetings will include

instructions for submitting comments and questions before each meeting.

NTESS and DOE give careful consideration to feedback, comments, and suggestions. We will address comments and provide the response to the organization or individual with whom it originated. Questions, suggestions, and comments specific to the UAA will be provided to NMED when the stakeholder is responded to.

4.0 WQCC Procedural Process

After responding to comments, and within 60 days of the public meeting, NTESS and DOE will petition the WQCC for a public hearing to consider the UAA and classification of the reach of Tijeras Arroyo addressed in the UAA as an ephemeral water to be listed in 20.6.4.97 NMAC.

The remainder of the public involvement process is governed by the Water Quality Act and the WQCC's procedural rules. NTESS and DOE will comply and facilitate as possible the remaining process, but it will occur in accordance with the procedural rules, 20.1.6 NMAC, at the discretion and under the jurisdiction of the WQCC. The following steps are anticipated (see table 2):

1) NTESS and DOE petition WQCC for a hearing
2) WQCC sets hearing date and publish notice in the New Mexico Register
3) WQCC sends a hearing notice to stakeholders and interested parties
4) WQCC issues a decision

5.0 References

20.6.4 NMAC, *Standards for Interstate and Intrastate Surface Waters.*

20.1.6 NMAC, *Rulemaking Procedures-Water Quality Control Commission.*

40 CFR 131 *Water Quality Standards.*

40 CFR 25.4, *Public Participation in Programs under the Resource Conservation and Recovery Act, the Safe Drinking Act, and the Clean Water Act*.

New Mexico Water Quality Control Commission, 2020. *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process.* September 21, 2020.

Sandia National Labs. *Work Plan: Use Attainability Analysis for Tijeras Arroyo (Rio Grande to Four Hills Bridge Reach, Assessment Unit ID NM-9000.1_070).* January 2023.

Sandia National Labs. *Use Attainability Analysis for Tijeras Arroyo (Rio Grande to Four Hills Bridge Reach, Assessment Unit ID NM-9000.1_070).* June 2023.

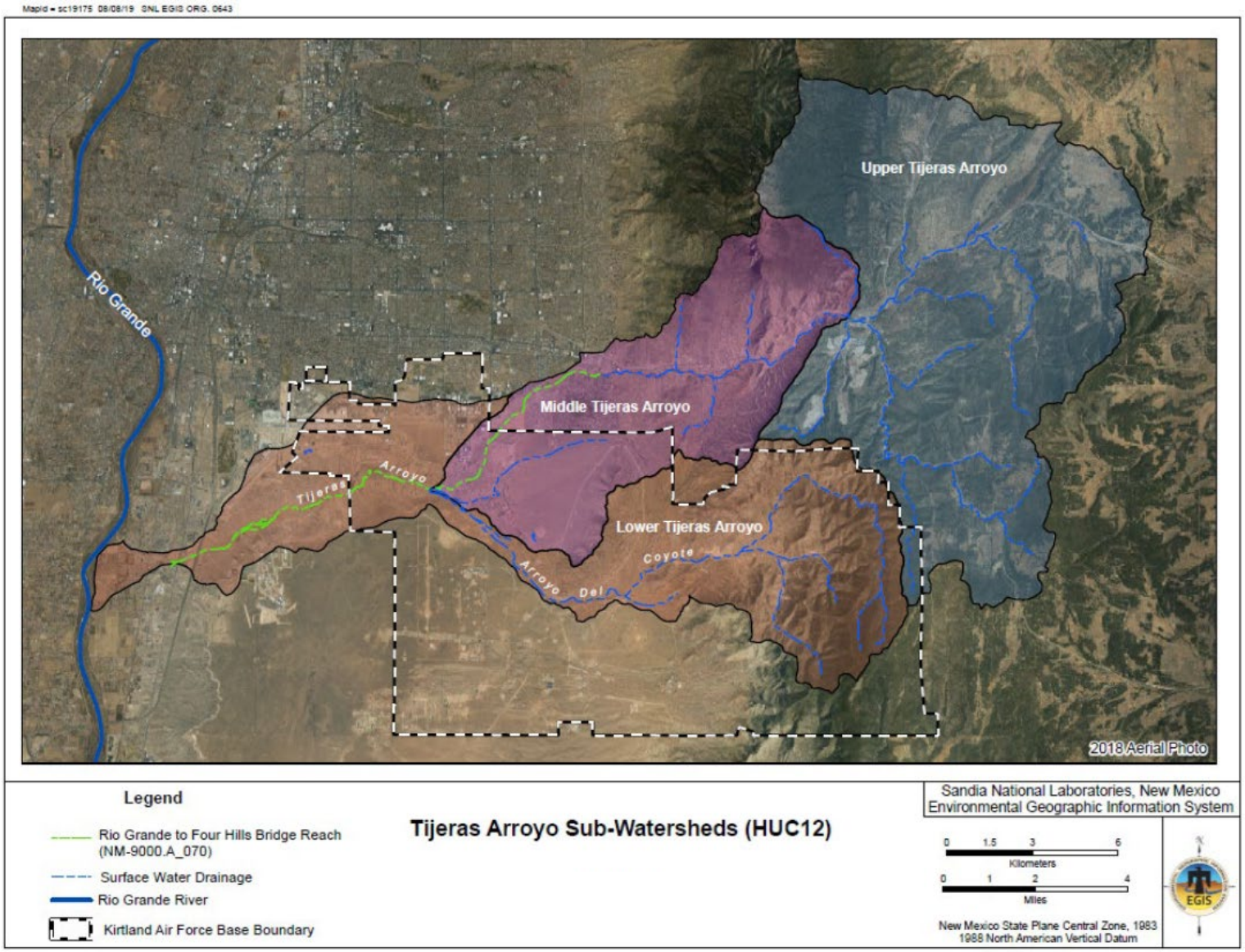
Table 1: Summary of NTESS and DOE Public Involvement Plan

Item Number	Activity	Timeline	Requirement or Guidance
1	Submit UAA to Surface Water Quality Bureau for review	Following completion of the UAA	• 20.6.4.15.D NMAC
2	Hold informal stakeholder meetings	Ongoing	• *State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process* (WQMP/CPP)
3	Hold 60-day public comment period for UAA	coordinated with NMED following UAA submittal	• 40 CFR 131.20 • WQMP/CPP
4	Hold a public meeting	Approximately 30 days after the start of the public comment period	• 40 CFR 25.6 • WQMP/CPP
5	Respond to comments (EPA, SWQB, and public) and revise UAA	Within 30 days of the end of the public comment period	• WQMP/CPP

Table 2: Anticipated WQCC Procedural Process

Item Number	Activity	Timeline	Requirement or Guidance
1	NTESS and DOE petition WQCC for a public hearing	Within 60 days of the end of the public comment period, after responding to comments	• 40 CFR 131.20 • 20.1.6.200 NMAC • NM WQA 74-6-6.A NMSA 1978 • WQMP/CPP
2	WQCC sets a hearing date and publish a notice in the New Mexico Register	At least 60 days prior to the hearing	• 20.1.6.201 NMAC • NM WQA 74-6-6 NMSA 1978 • WQMP/CPP
3	WQCC sends the hearing notice to other interested parties	At least 60 days prior to the hearing	• 20.1.6.201 NMAC • NM WQA 74-6-6 NMSA 1978
4	WQCC holds a hearing with oral testimony, presentation of exhibits, and cross-examination	Day of the hearing	• 20.1.6.300-302 NMAC • NM WQA 74-6-6.A NMSA 1978 • WQMP/CPP
5	WQCC issues a decision of the proposed rule	Up to 60 days following the hearing	• 20.1.6.306 NMAC • NM WQA 74-6-4.E NMSA 1978 • WQMP/CPP

Figure 1: Location of Rio Grande to Four Hills Bridge Reach of Tijeras Arroyo



NTESS Exhibit 11

Fact Sheet
Tijeras Arroyo Use Attainability Analysis
SAND2025-00685O

National Technology & Engineering Solutions of Sandia, LLC (NTESS), on behalf of the United States Department of Energy (DOE)/National Nuclear Security Administration (NNSA)/Sandia Field Office (SFO), has conducted a Use Attainability Analysis (UAA) for the Rio Grande to Four Hills Bridge reach of the Tijeras Arroyo (AU NM-9000.A_070), located in Albuquerque, New Mexico (Figure 1). NTESS is the management and operating contractor for Sandia National Laboratories, New Mexico (SNL/NM), and DOE/NNSA/SFO administers the SNL/NM contract. SNL/NM is located within the boundaries of Kirtland Air Force Base (KAFB), in Bernalillo County, New Mexico (Figure 1).

The UAA was conducted to assess the highest attainable use associated with the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo. The reach is currently classified as an intermittent stream with designated uses of marginal warmwater aquatic life, primary human contact, livestock watering, and wildlife habitat. However, the reach has long exhibited ephemeral characteristics with flow occurring infrequently, briefly, and only in direct response to precipitation (stormwater runoff).

This UAA was conducted by evaluating historic and recent hydrologic, geomorphic, and ecologic indicators of flow. It also relied on the results of field surveys conducted using the New Mexico Environment Department's Hydrology Protocol method for differentiating ephemeral and intermittent water bodies.

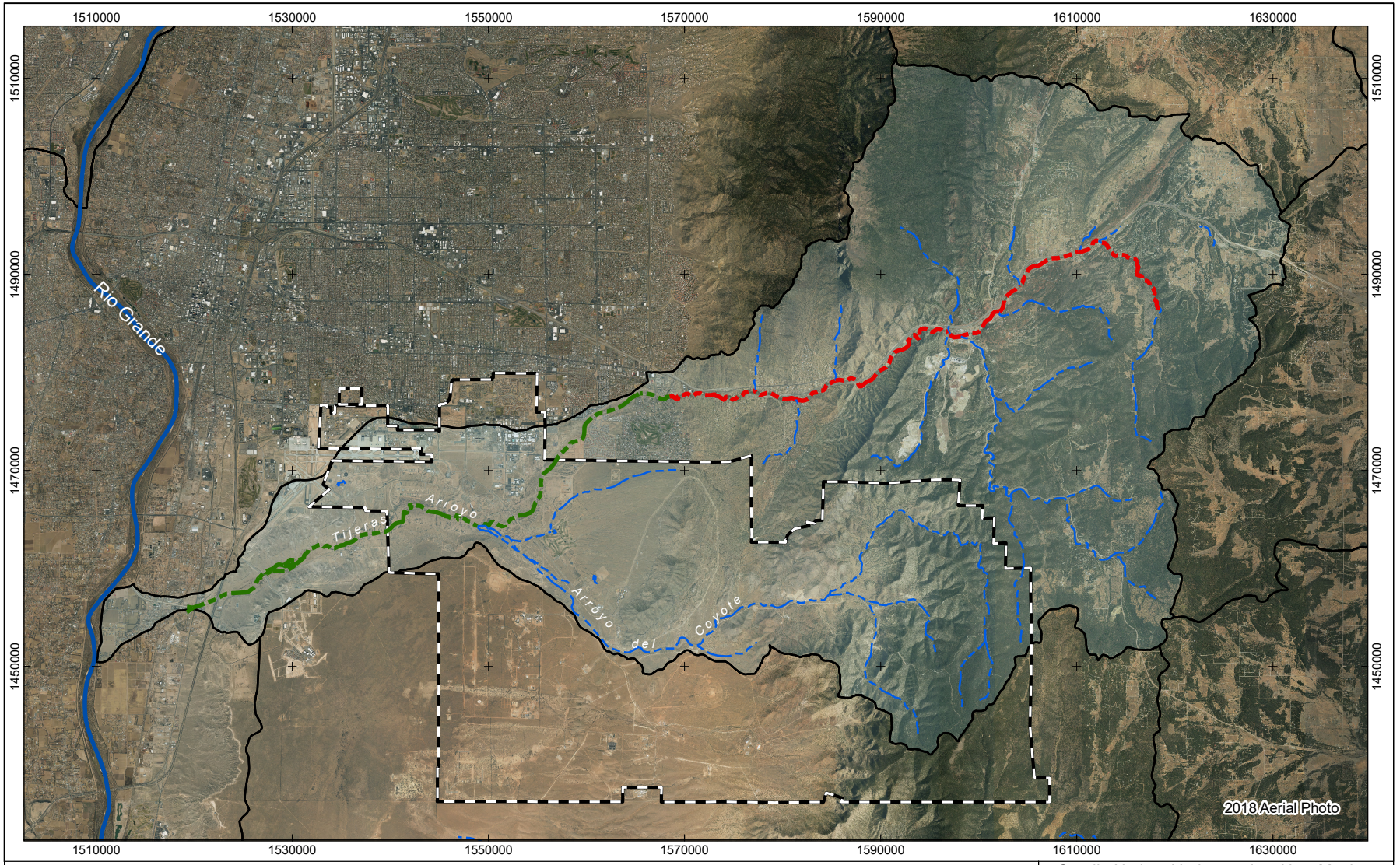
Based on the information presented in the UAA, the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo (AU NM-9000.A_070) exhibits characteristics of an ephemeral water body. The UAA documents that the reach cannot support the current designated uses of marginal warmwater aquatic life and primary contact associated with intermittent waters, and provides the technical basis for reclassifying the reach as ephemeral with the designated uses of limited aquatic life and secondary human contact.

Geology was identified as the primary factor causing the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo to be ephemeral. The thick sequence of unconsolidated sediment in the Albuquerque Basin and the deep water table promote rapid infiltration of surface water, depleting any base flows that might originate from the shallow bedrock water table located upstream. While perennial and intermittent flow occurs upstream in the Four Hills Bridge to headwaters reach (Figure 1) these flows infiltrate rapidly at the boundary between bedrock and basin fill a short distance upstream of the Rio Grande to Four Hills Bridge reach.

DOE and NTESS intend to petition the New Mexico Water Quality Control Commission for an amendment of the reach's classification based on its highest attainable use through the standard rulemaking process for entities other than NMED in accordance with 20.6.4.15(E) NMAC.

DOE and NTESS are not seeking, anticipating, or contemplating any new discharges to Tijeras Arroyo or changes to our operations that would alter the volume or quality of stormwater discharged from SNL/NM. Our interest in changing the designation from intermittent to ephemeral is to promote regulatory compliance based on actual hydrologic conditions.

Mapid = sc19174 08/08/19 SNL EGIS ORG. 0643



Legend

- Rio Grande to Four Hills Bridge Reach (NM-9000.A_070)
- Four Hills Bridge to Headwaters Reach
- Surface Water Drainage
- Rio Grande
- Kirtland Air Force Base Boundary

Figure 1
Tijeras Arroyo Watershed and Reaches

SAND2025-00685O

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

0 1.5 3 6
Kilometers

0 1 2 4
Miles

New Mexico State Plane Central Zone, 1983
1988 North American Vertical Datum

N

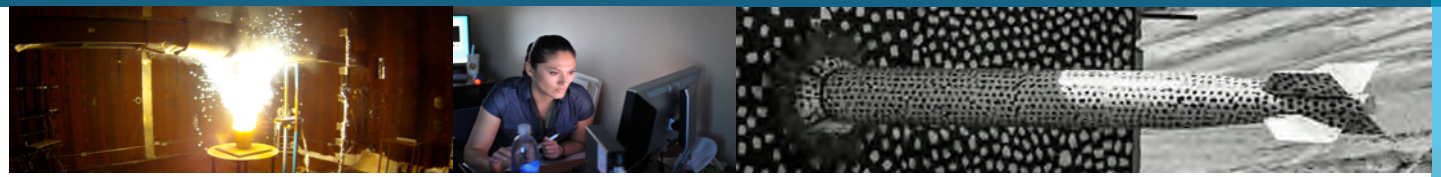
EGIS

NTESS Exhibit 12

Sandia National Laboratories

Tijeras Arroyo
Rio Grande to Four Hills Bridge Reach
Use Attainability Analysis





Stormwater Quality Program
Department of Environmental Compliance and Monitoring
March 5, 2025

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.
SAND2025-02400PE

Welcome

Restrooms are located right outside the meeting room, but the memorial is closed.

The meeting will run from 6:00 to 7:00.

The presentation is about 30 minutes long.

After the presentation we will have 30 minutes for questions and discussion.

Questions and comments that you would like documented and addressed in our Final Report can be submitted using the cards provided.

There flyers on the table that include links to additional information and instructions on how comments can be made online.

Introductions

National Technology & Engineering Solutions of Sandia, LLC (NTESS)

- Operator of SNL/NM under contract to DOE

Department of Energy/National Nuclear Security Administration/Sandia Field Office (DOE/NNSA/SFO)

- Owner of Sandia National Laboratories

Sandia National Laboratories, New Mexico (SNL/NM)

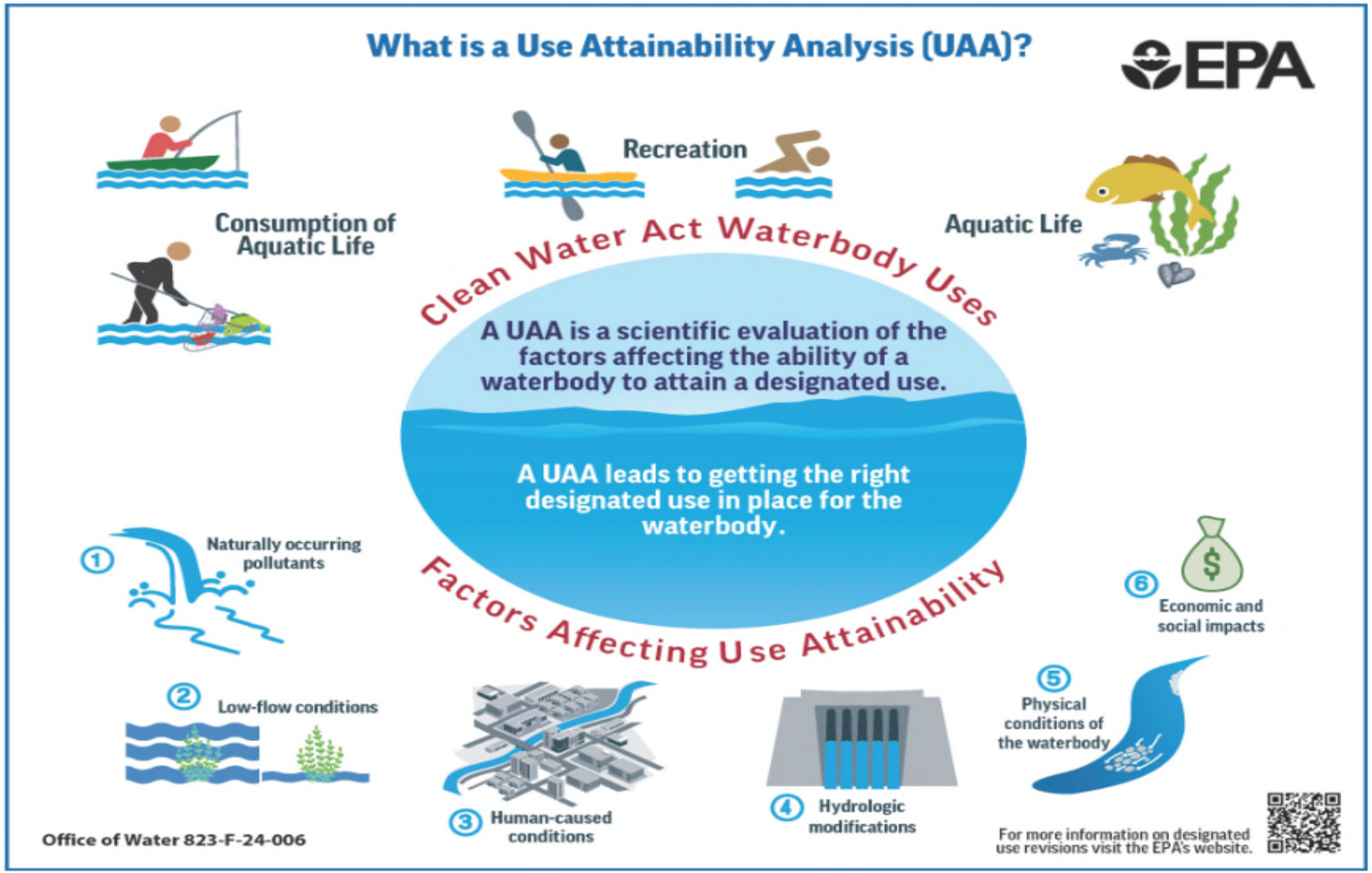
- Facility Name

Overview of Presentation

1. UAA Background- What, Why, Where?
2. Hydrologic Conditions Affecting Flow in Tijeras Arroyo
3. Field Surveys of Tijeras Arroyo
4. Results and Conclusions
5. Next Steps



What is a Use Attainability Analysis?



Why is this UAA Study Being Conducted?

To assess the highest attainable uses associated with the Rio Grande to Four Hills Bridge reach of Tijeras Arroyo.

Specifically, the UAA assesses whether the reach is ephemeral or intermittent.

In New Mexico, all surface water bodies are considered perennial or intermittent unless a UAA is conducted to change it to ephemeral.

Based on the results obtained from the UAA, and comments received during the public review and comment period, SNL/NM may petition the Water Quality Control Commission to recharacterize the reach from intermittent to ephemeral as a result of the UAA study.

Use Attainability Analysis

In order to change a designated use, a UAA is required to demonstrate that a designated use is not feasible based on at least one of the following factors identified in 40 CFR 131.10(g):

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or

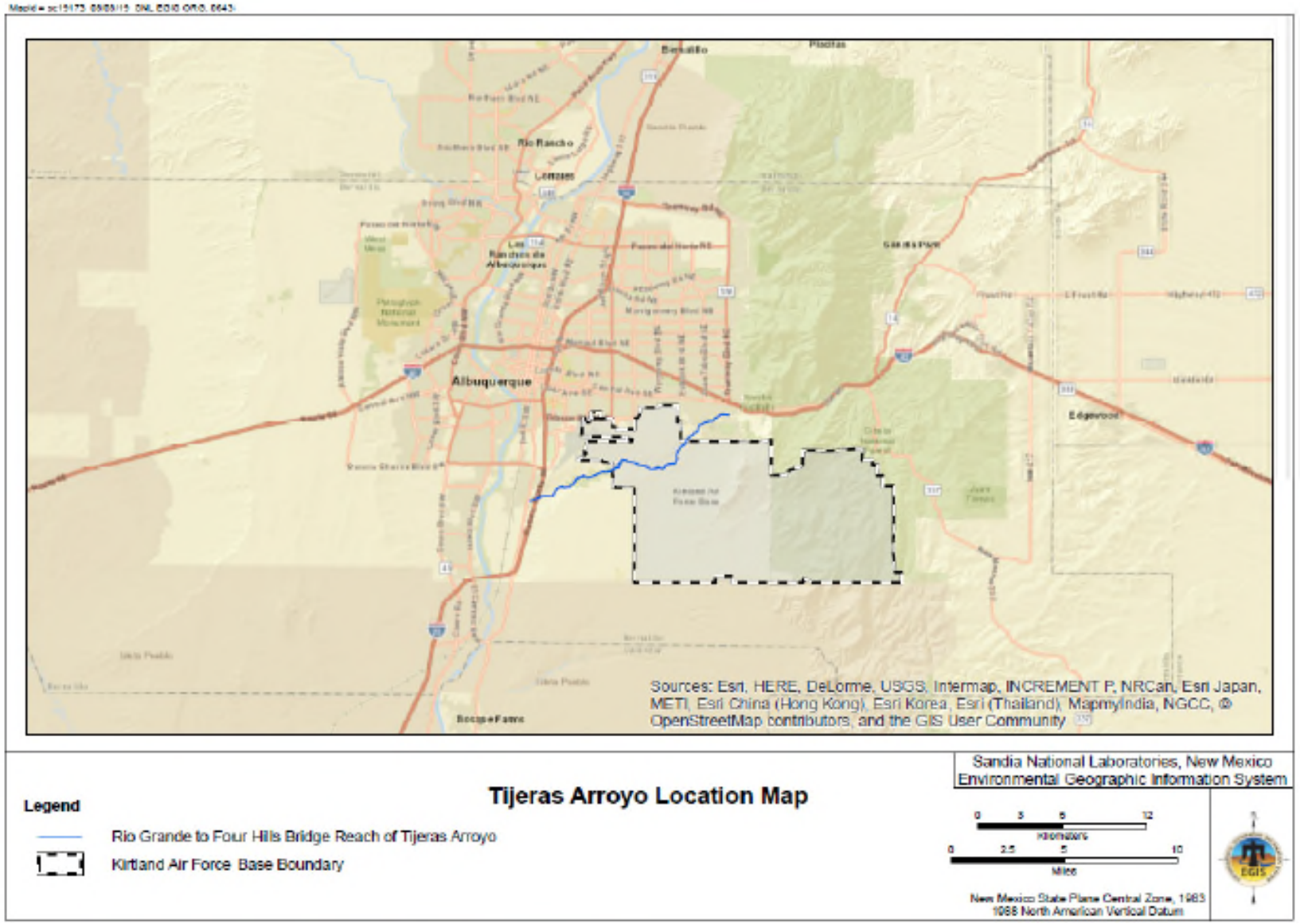
(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

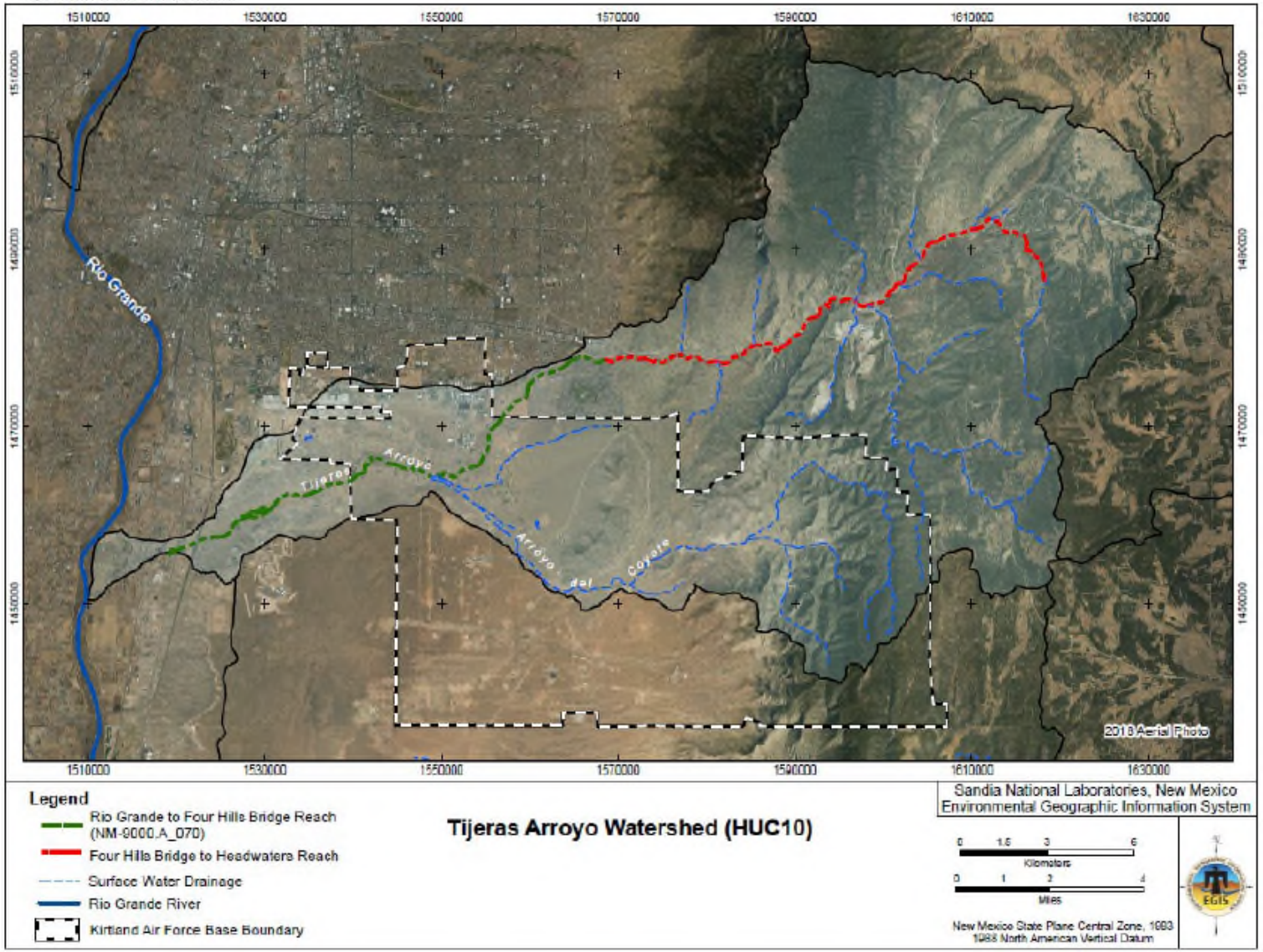
(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Location of Tijeras Arroyo



Location of Tijeras Arroyo



Genesis of Tijeras Arroyo UAA Effort

Comment in Appendix A of the NMED 303(d)/305(b) Integrated Report
https://www.env.nm.gov/surface-water-quality/303d-305b/

Tijeras Arroyo (Rio Grande to Four Hills Bridge)			AU IR CATEGORY	LOCATION DESCRIPTION	
			3/3A	HUC: 13020203 Rio Grande-Albuquerque	
AU ID	**WQS REF**	**WATER TYPE**	**SIZE**	**ASSESSED**	**MONITORING SCHEDULE**
NM-9000.A_070	20.6.4.98	STREAM, INTERMITTENT	13.42 MILES	2008	2025
USE	**ATTAINMENT**	**CAUSE(S)**	**FIRST LISTED**	**TMDL DATE**	**PARAMETER IR CATEGORY**
LW	Not Assessed				
MWWAL	Not Assessed				
PC	Not Assessed				
WH	Not Assessed				
AU Comment: Application of the SWQB Hydrology Protocol (survey date 6/24/09) indicate this assessment unit is ephemeral (Hydrology Protocol score of 3.0 with 89.1% days with no flow at USGS gage 08330600 - see https://www.env.nm.gov/surface-water-quality/hp/ for additional details on the protocol). The process detailed in 20.6.4.15 NMAC Subsection C must be completed in order to a waterbody under 20.6.4.97 NMAC. Until such time, this waterbody will remain under 20.6.4.98 NMAC.					

Difference Between Intermittent and Ephemeral

Intermittent: *…the water body contains water for extended periods only at certain times of the year, such as when it receives seasonal flow from springs or melting snow (NMAC 20.6.4.7).*

Ephemeral: *…the water body contains water briefly only in direct response to precipitation; its bed is always above the water table of the adjacent region (NMAC 20.6.4.7)*

Water Type	Designated Use	Description
Intermittent (NMAC 20.6.4.98)	Livestock watering	Can be used as a water supply for livestock
	Wildlife habitat	Can be used by plants and animals
	Marginal warmwater aquatic life	Can support limited aquatic life on a continuous annual basis
	Primary human contact	Can support activities involving prolonged and intimate human contact involving considerable risk of ingestion
Ephemeral (NMAC 20.6.4.97)	Livestock watering	Can be used as a water supply for livestock
	Wildlife habitat	Can be used by plants and animals
	Limited aquatic life	Can support limited aquatic life specifically adapted to rapidly changing environmental conditions
	Secondary human contact	Can support activities involving human contact where risk of ingestion is minimal

What Would an Ephemeral Classification Change?

Ensure appropriate regulation of stormwater quality by aligning regulations with hydrologic conditions. The main thing that would change is acute rather than chronic water quality standards for metals. SNL/NM has no plans or intentions to change our current discharges.

Stormwater Permit Parameter	Ephemeral WQS (mg/L)**	Intermittent WQS (mg/L)**
Aluminum*	8.838 (b)	3.541 (a)
Arsenic	0.34 (c)	0.15 (a)
Cadmium*	0.00298 (b)	0.00075 (a)
Copper*	0.026 (b)	0.016 (a)
Cyanide	0.022 (d)	0.0052 (a, d)
Lead*	0.14 (b)	0.005 (a)
Mercury*	0.0014 (d)	0.00077 (d)
Selenium	0.005 (d)	0.005 (a, d)
Silver*	0.011 (b)	0.011 (a)
Zinc*	0.301 (b)	0.228 (a)

(a) Marginal warmwater aquatic life standard; chronic

(b) Limited aquatic life standard; acute

(c) Livestock watering standard

(d) Wildlife Habitat standard

- hardness-based metal

** NMAC 20.6.4.900

UAA Process

Item Number14	Activity	Timeline
1	Prepare Work Plan and Provide to NMED	Before work starts
2	Conduct Office Work- data compilation	
3	Conduct Field Surveys	
4	Prepare UAA Report	
5	Submit UAA to Surface Water Quality Bureau for review	Following completion of the UAA
6	Hold 60-day public comment period for UAA Conduct Stakeholder Meetings as requested	coordinated with NMED following UAA submittal
7	Hold a public meeting	Approximately 30 days after the start of the public comment period
8	Respond to comments (EPA, SWQB, and public) and revise UAA	Within 30 days of the end of the public comment period
9	Petition WQCC to be placed on the agenda to request a public hearing with a proposed date for such hearing	Within 60 days of the end of the public comment period, after responding to comments
10	Publish the hearing notice published in the New Mexico Register. Send the hearing notice to other interested parties.	At least 60 days prior to the hearing
11	Have a hearing with oral testimony, presentation of exhibits, and cross-examination	Day of the hearing
12	Receive the WQCC deliberation and decision of the proposed rule	Up to 60 days following the hearing

List of Stakeholders Notified

Albuquerque Metropolitan Area Flood Control Authority

Amigos Bravos

Bernalillo County

Bosque Ecosystem Monitoring Program

City of Albuquerque

Friends of the Valle de Oro

Kirtland Air Force Base

Mesa Del Sol

Middle Rio Grande Conservancy District

Mountain View Neighborhood Association

The Nature Conservancy

N.M. Department of Transportation

N.M. Environment Department

N.M. Interstate Stream Commission

Pueblo of Isleta

Tijeras Creek Watershed Initiative

U. S. Army Corp of Engineers

U.S. Bureau of Reclamation

U.S. Geological Survey

U.S. EPA Region 6

U.S. Fish and Wildlife Service

Valle de Oro National Wildlife Refuge

Timeline of Work Conducted to Date

Date	Major Milestones
03/08/17	NTESS provides DOE a written proposal to conduct the UAA
04/10/17	DOE approves NTESS to move forward with the UAA
06/20/17	DOE submits Work Plan v.1 (dated 5/5/2017) to NMED
09/21/17	NMED provides comments to DOE on Work Plan v.1 (dated 5/5/2017)
12/20/17	DOE submits revised Work Plan v.2 (dated 10/23/2017) to NMED
02/09/18	NMED Approves Work Plan v.2 (dated 10/23/2017)
June 2019	NTESS conducts stream channel surveys using NMED Hydrology Protocol methods
Jul-Dec 2019	NTESS prepares Draft UAA
06/08/20	DOE submits Draft UAA (dated 12/18/19) to NMED
09/21/21	NMED provides formal written comments on Draft UAA (dated 12/18/2019)
08/23/22	DOE submits Draft UAA v.2 (Dated 7/14/2022) to NMED
10/03/22	NMED requests changes to work plan based on discussions with EPA
12/31/22	DOE transmits Work Plan v.3 to NMED
03/08/23	NMED approves Work Plan v.3
04/05/23	NMED transmits formal comment on Draft UAA v.2
08/08/23	DOE transmits Draft v.3 to NMED
10/10/23	NMED gives verbal approval of UAA
10/21/24	DOE submit Draft Public Involvement Plan to NMED for review
10/22/24	NMED approves Public involvement Plan
02/14/25	NTESS/DOE publish notice of 60-day public review and comment period
03/05/25	NTESS/DOE hold public meeting

Hydrogeologic Factors Affecting Flow

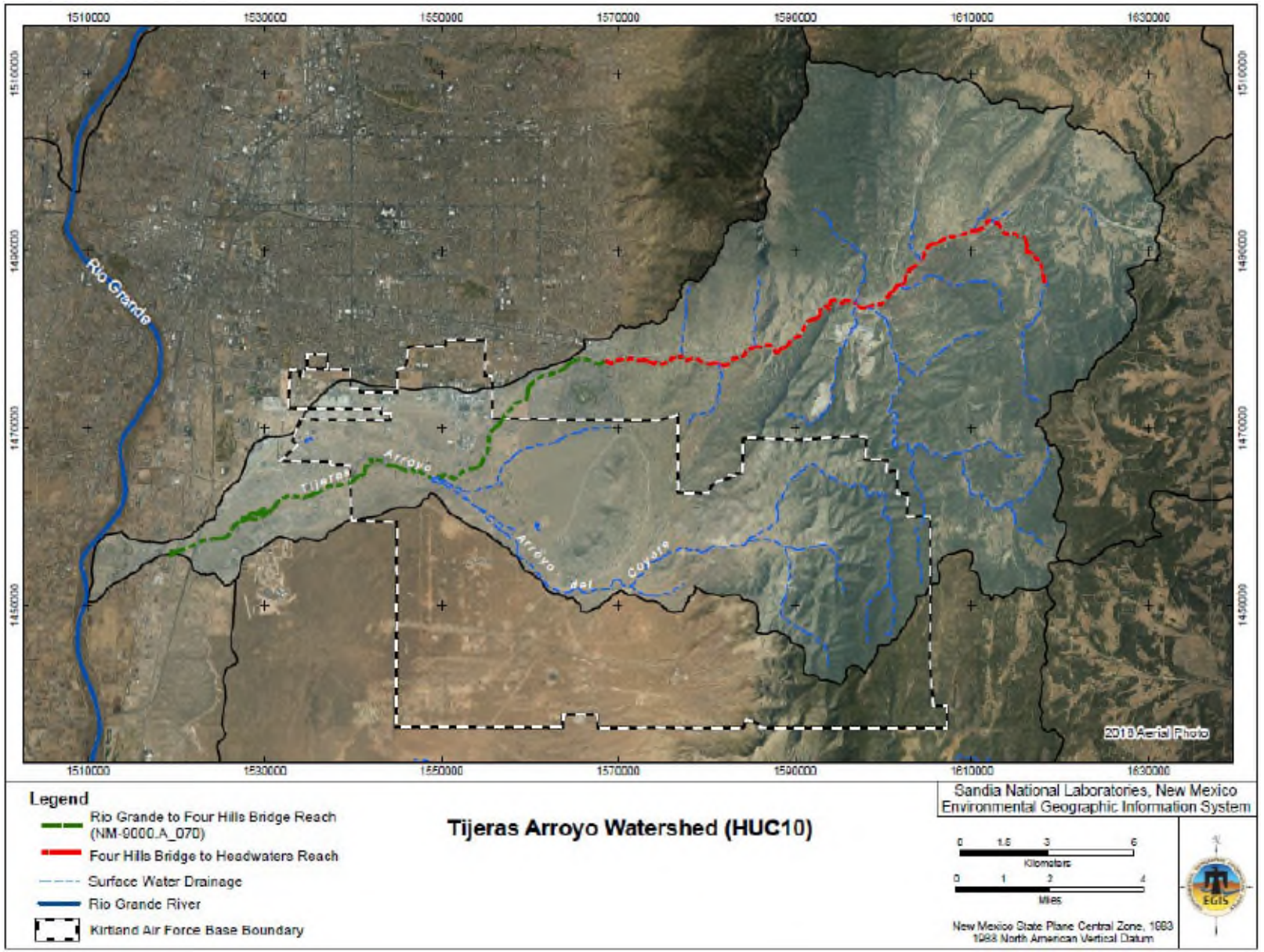
- Watershed Boundaries
- Geology
- Topography
- Climate
- Ecoregions (Vegetation)
- Soils
- Land Use History
- Groundwater Conditions
  - Depth to groundwater
  - Groundwater-Surface Water Interaction
- Surface Water Conditions
  - Flow
  - Water Quality



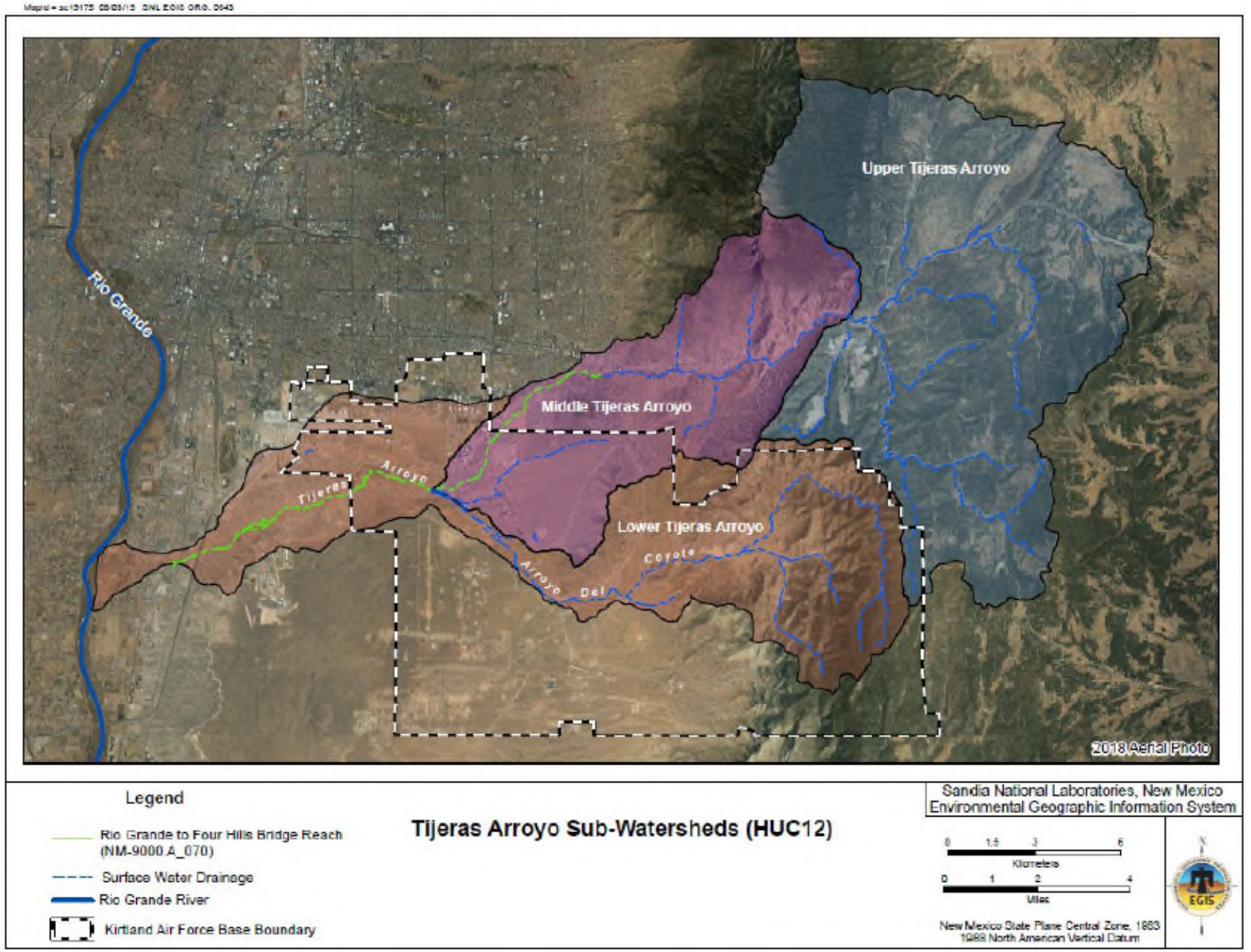
NTESS Technical Team

Team Member	SNL/NM Program	Primary UAA Role	Degree/Certification
John Kay	Stormwater	Project Lead Surface Water	MS Hydrology, Professional Geologist (CA)
Kathie Deal	Stormwater	Regulatory guidance Regulatory review	MS Environmental Science
Joe Fontana	Meteorology	Climate Precipitation	MS Atmospheric Sciences
Jennifer Payne	Ecology	Vegetation Aquatic life	BS Biology, MS Water Resources Management, Certified Ecological Restoration Practitioner (Society for Ecological Restoration)
Mike Skelly	Groundwater	Geology Groundwater	MS Geology, Professional Geologist (WY)
Sonny Casaus	GIS	Geographic data Maps	GIS Certified Professional
Steven Toler	Surveyor	Stream channel surveys	BS Civil Engineering NM Registered Professional Land Surveyor

Watershed Boundaries



Watershed Boundaries



Land Use History and Discharges to Tijeras Arroyo

Historic Human Related Disturbances

- Native American settlements
- Early European settlers/land grants
- Livestock grazing
- Land clearing (deforestation)
- Vegetation conversion
- Mining
- Military operations
- Urbanization
- Offroad vehicle use
- Outdoor recreation
- Road construction
- Landfills
- Stream channel modifications

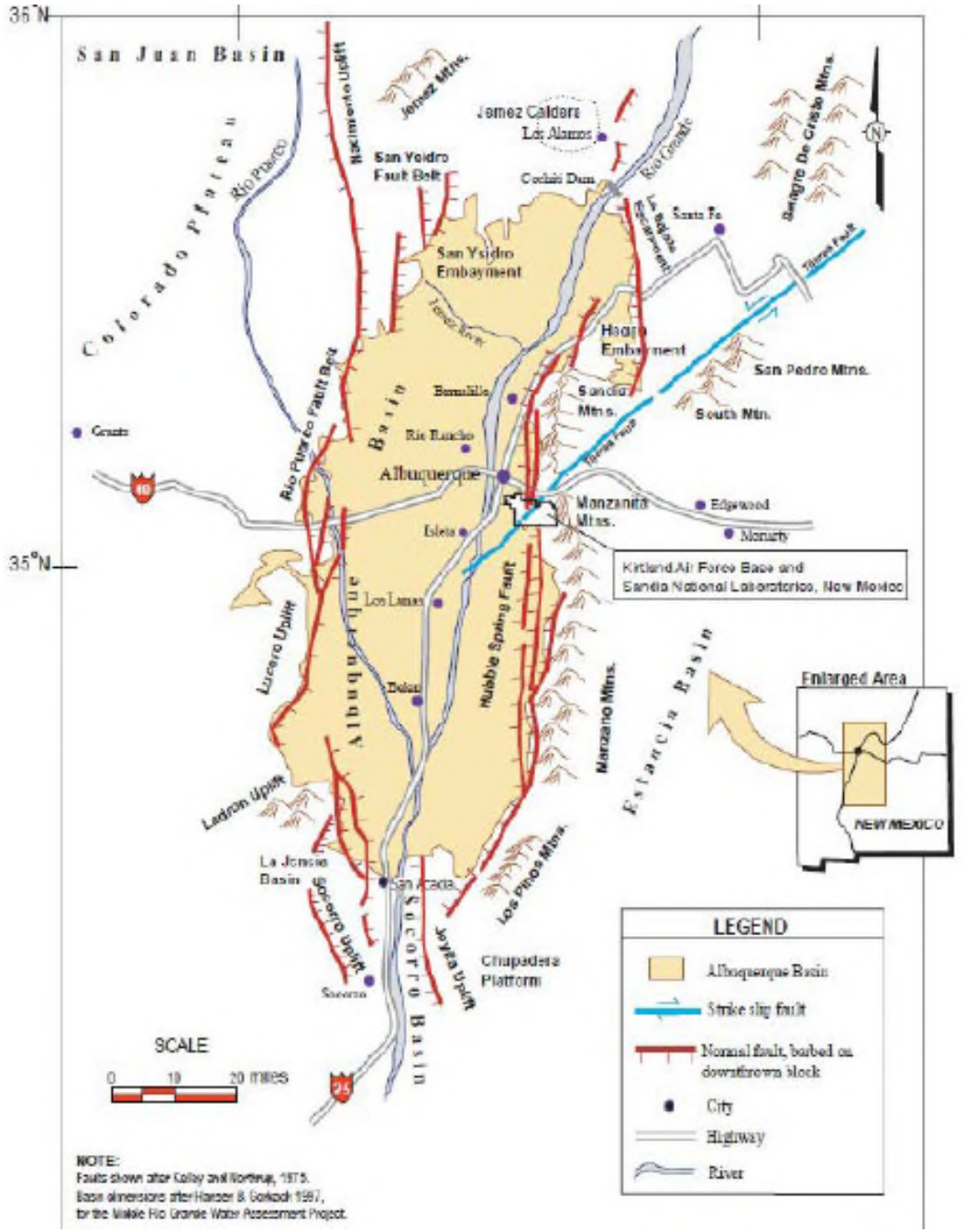
Surface Water Discharges

- Stormwater discharges permitted for
  - SNL/NM
  - KAFB
  - COA
  - Bernalillo County
  - AMAFCA
- Surface discharge permit for treated effluent from KAFB
- No other permitted discharges
- Urbanization increases discharges to the arroyo

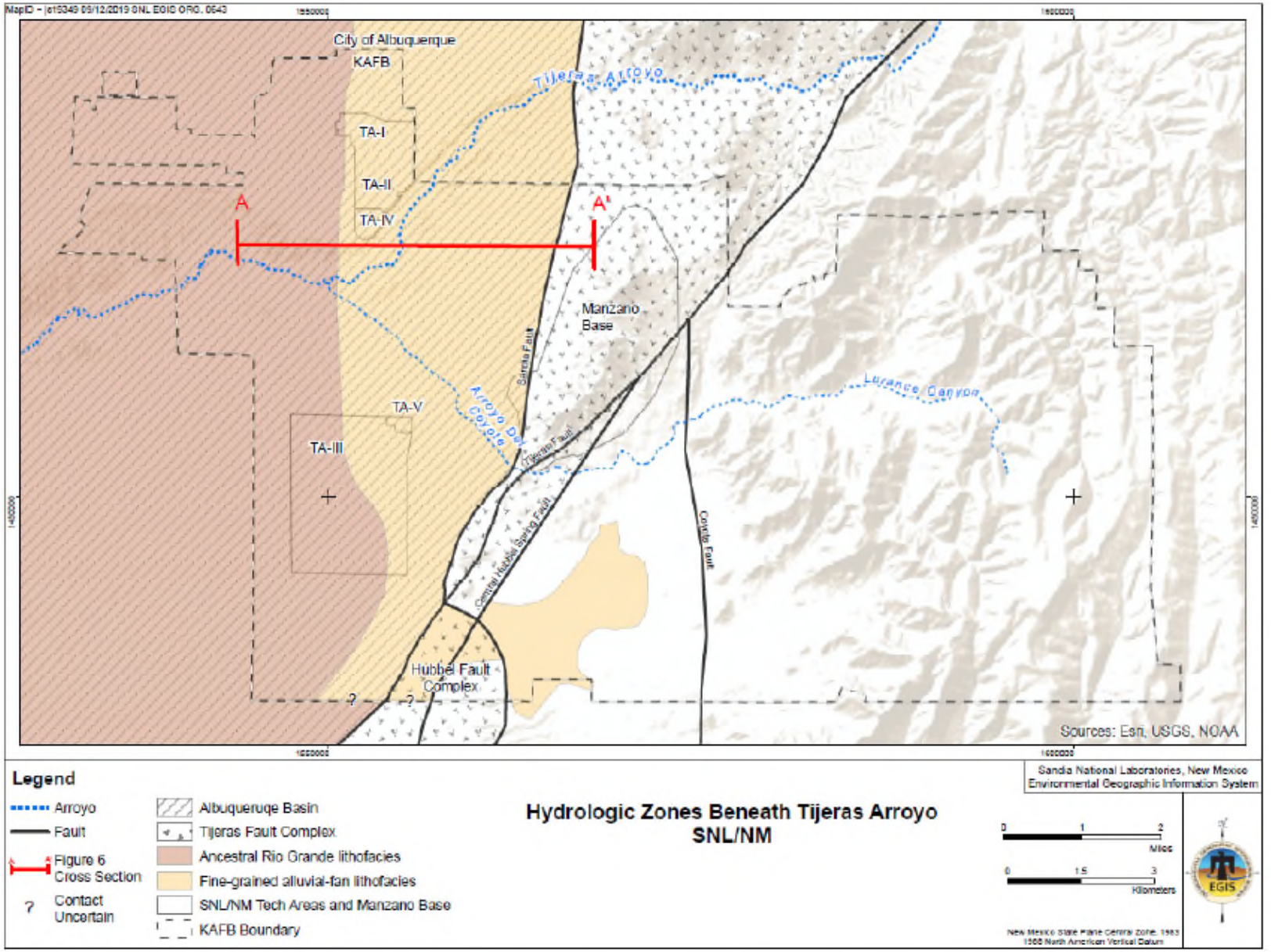
Surface Water Rights, Declarations, & Diversions

- None registered with the Office of the State Engineer
- None identified during field surveys

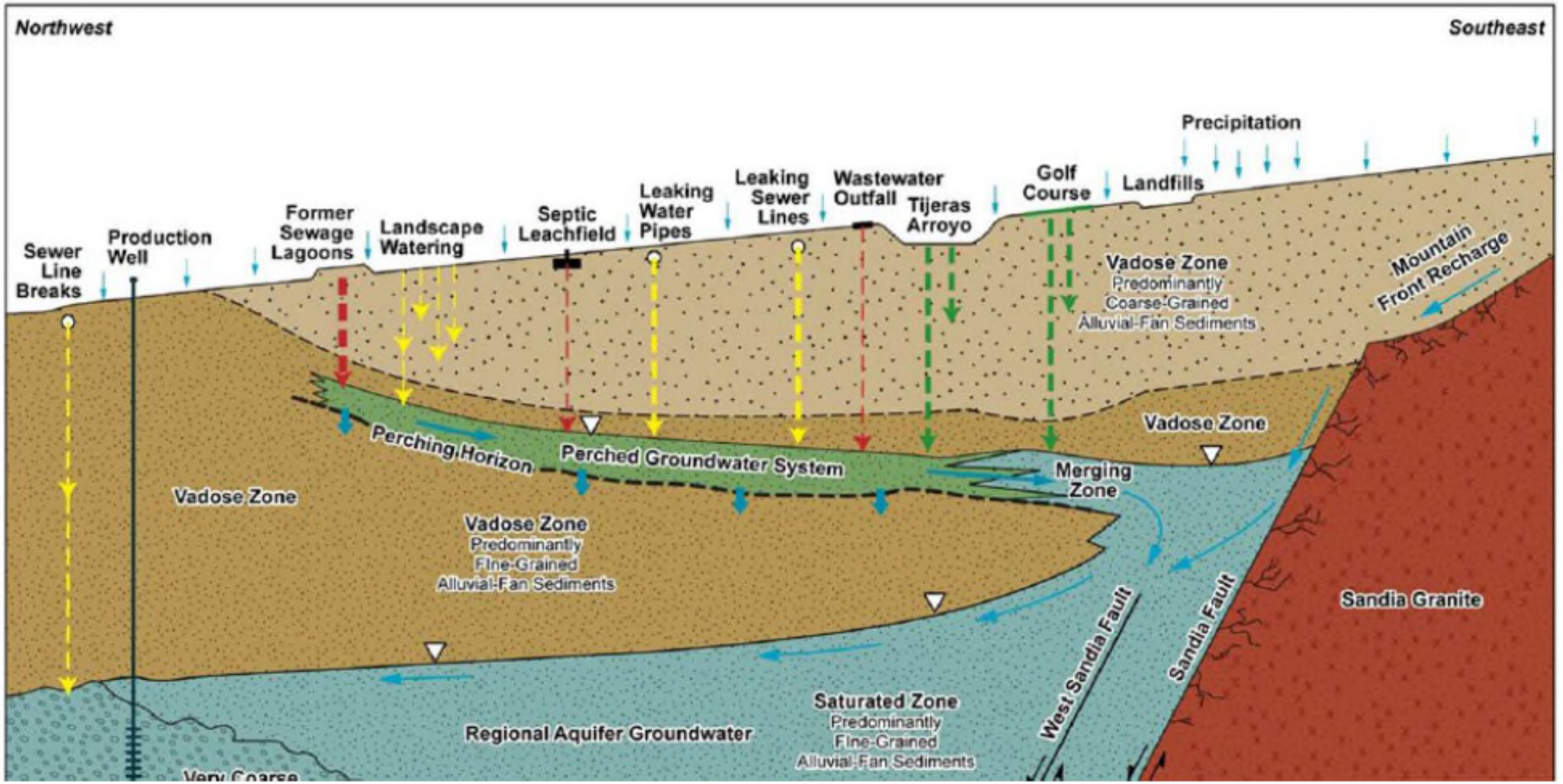
Geologic Setting



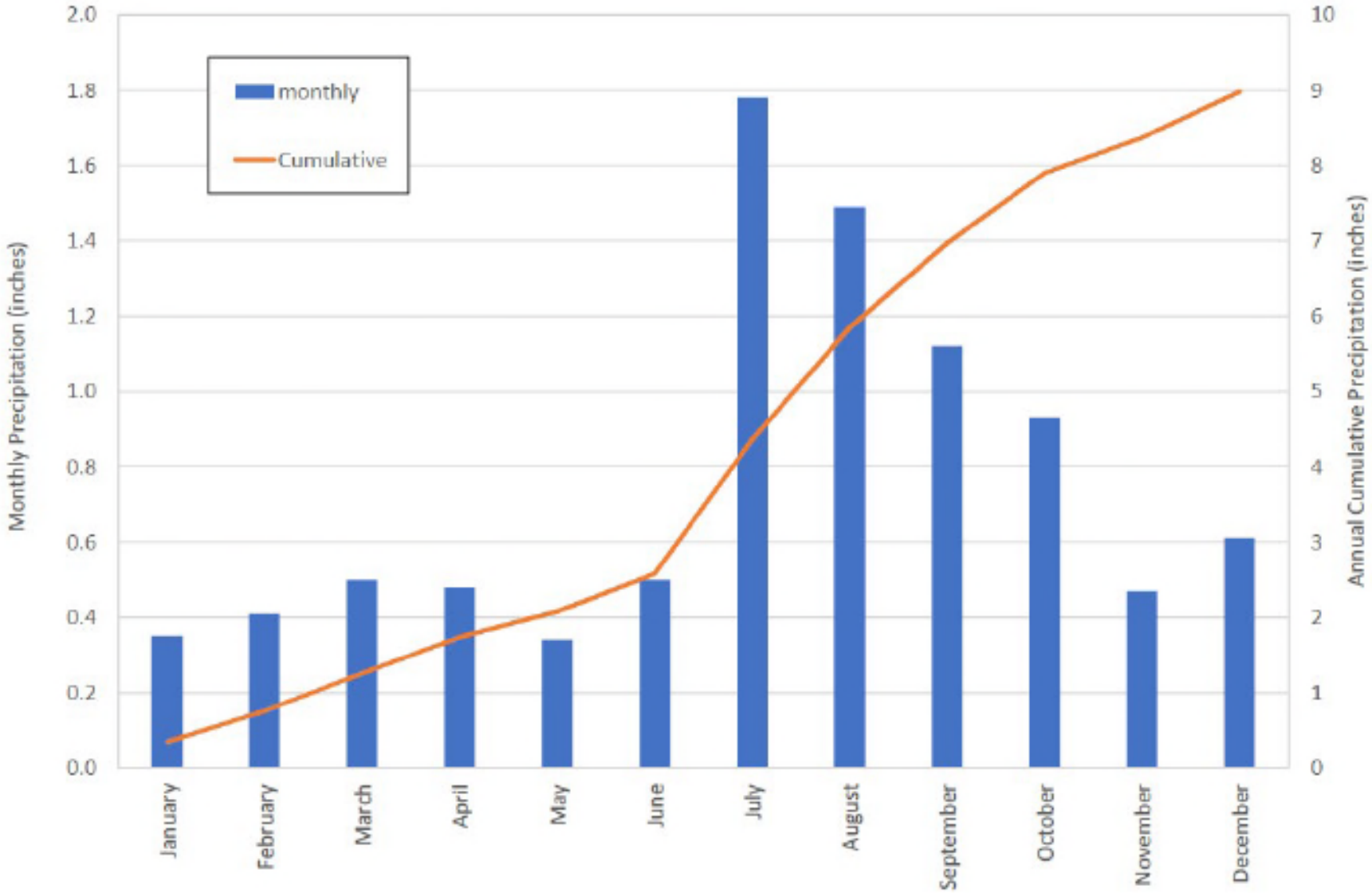
Geologic Setting



Groundwater Conditions



Precipitation- A21 Tower 1994-2018



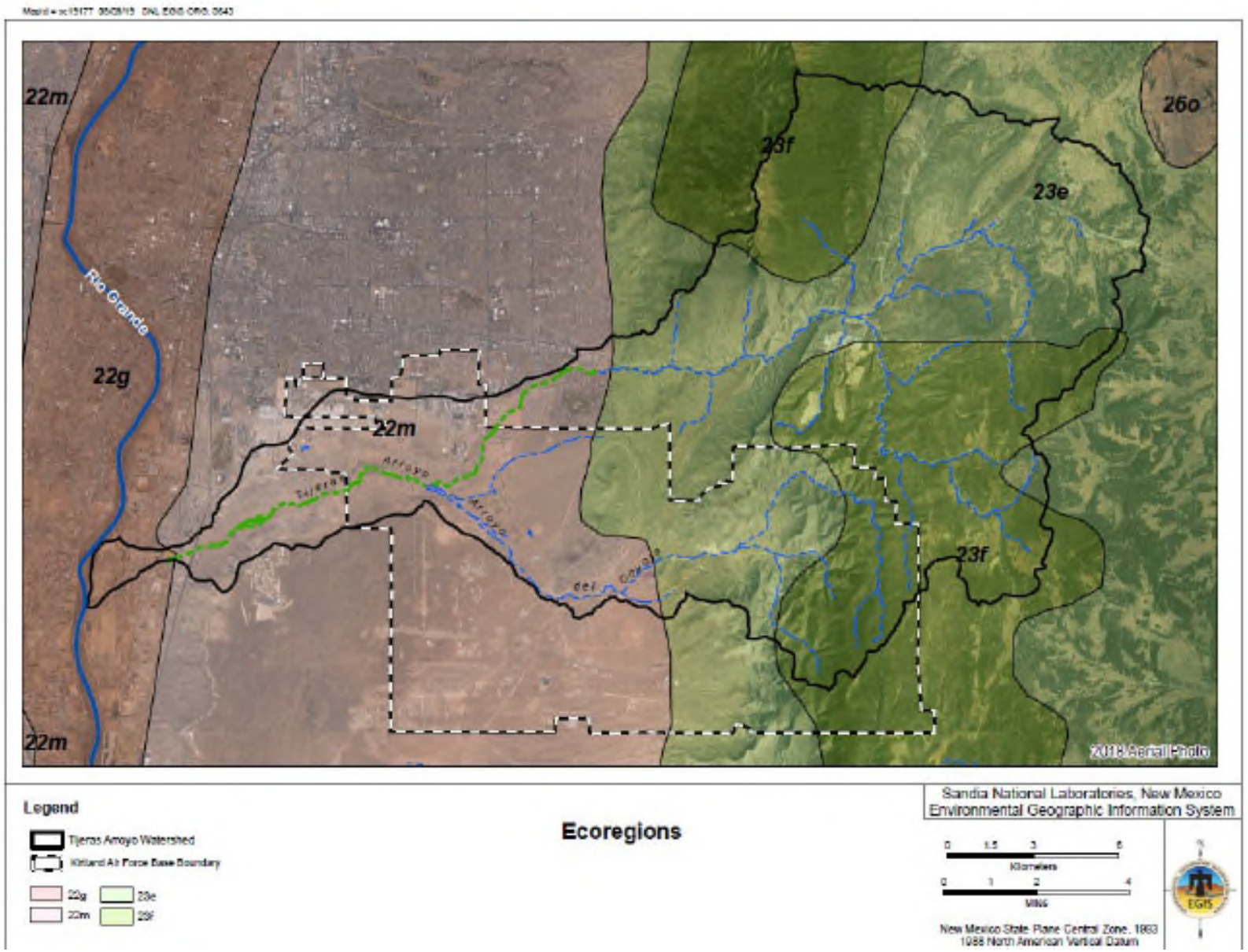
Precipitation occurs primarily July-October during summer monsoon period.

Precipitation is highly localized and doesn't occur over large areas.

We can have a 1-inch rain event at SNL/NM and Tijeras doesn't flow.

Tijeras can flow when we haven't had any rainfall at SNL/NM.

Eco-regions



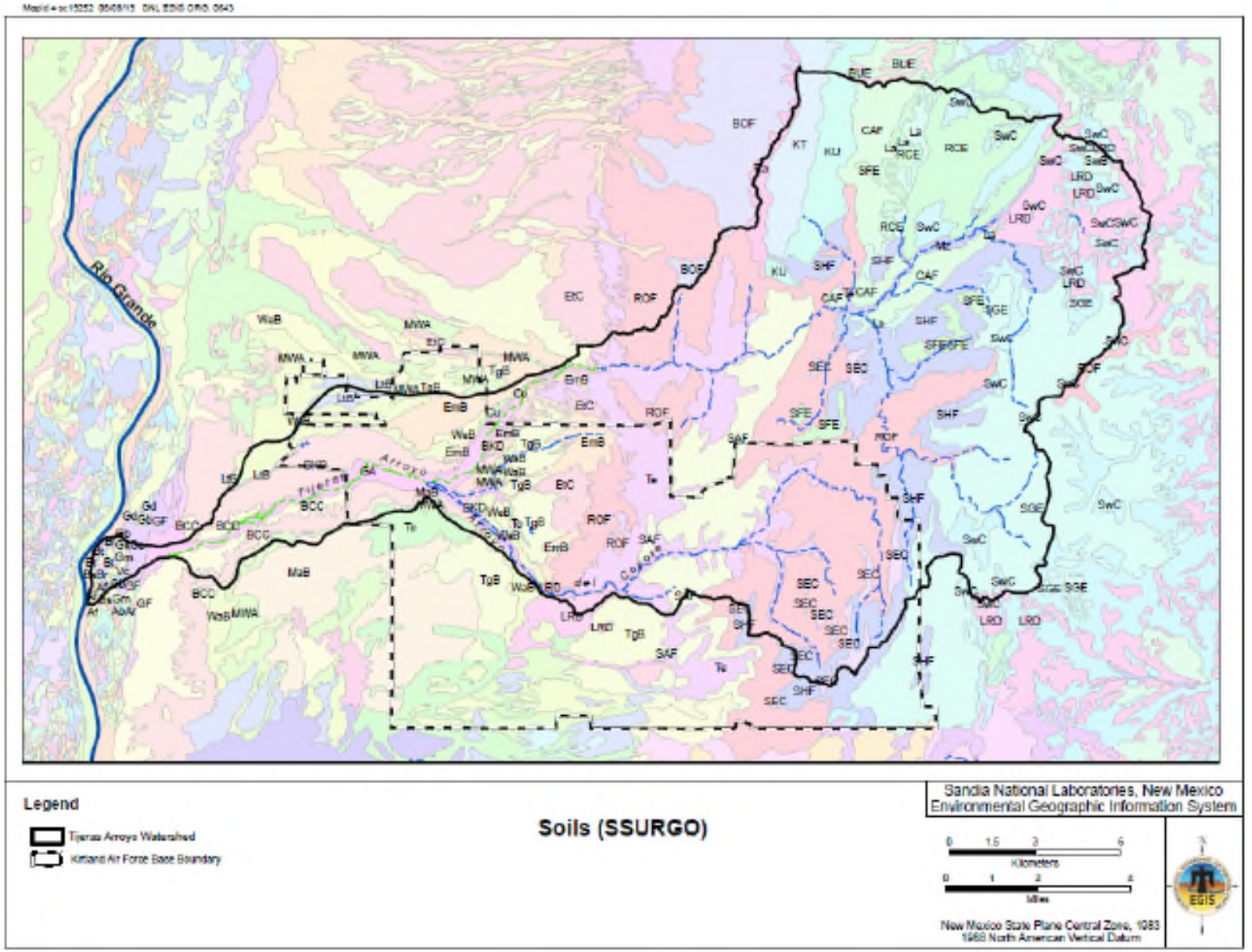
US Forest Service (Griffith et al., 2006):

Ecoregion 22: New Mexico Plateau
- 22m: sandy grasslands
- 22g: Rio Grande floodplain

Ecoregion 23: New Mexico Mountains
- 23e: conifer forests and savannas
- 23f: Rocky Mountain conifers

Boundary between 22 and 23 coincides with flow regimes in Tijeras Arroyo.

Soils



NRCS Soil Survey Geographic Data (SSURGO):

Tijeras Arroyo stream channel

- Mostly Gila fine sandy loam
- well drained
- runoff classification = low
- 0.6-2.0 inches/hour infiltration

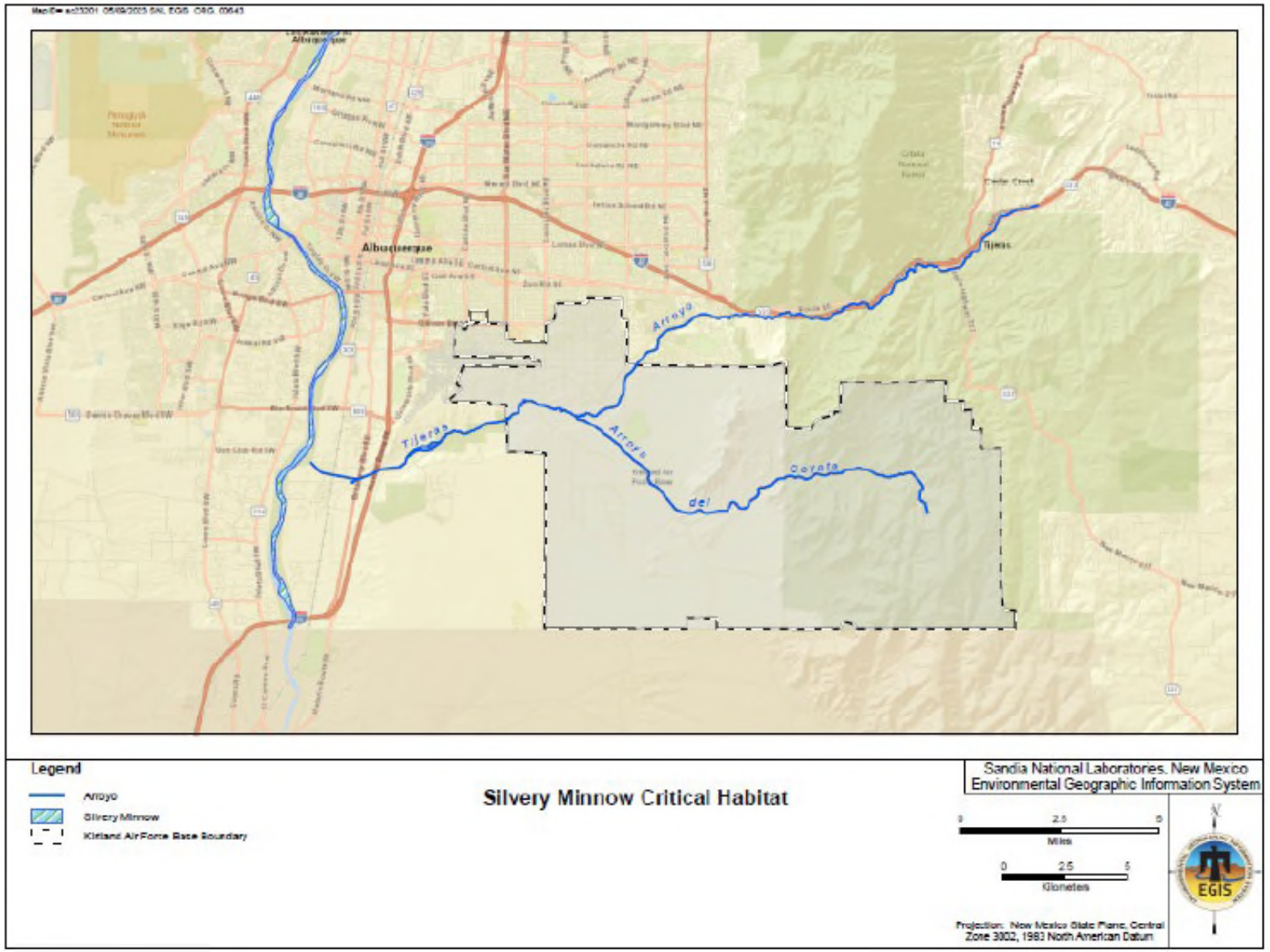
Surrounding uplands

- Embudo, Latene, Madurez, Tijeras, and Wink
- well drained soils

Soils in and around Tijeras Arroyo promote rapid infiltration which decreases runoff.

Rule of thumb: first 1" of rainfall infiltrates.

Endangered Species Habitat



<u>US Fish & Wildlife Information for Planning and Consulting (IPaC):</u>

5 threatened or endangered species within proximity of Tijeras Arroyo:

- New Mexican jumping mouse
- Mexican spotted owl
- Southwest willow flycatcher
- Yellow-billed cuckoo
- Rio Grande Silvery Minnow

No habitat for any of these along the Tijeras Arroyo reach.

Silvery minnow habitat at confluence of Tijeras and Rio Grande and both upstream and downstream.

Tijeras Arroyo contributes minimal flow in the Rio Grande below it's confluence.

Surface Water Conditions

Limited flow and water quality data for Tijeras Arroyo

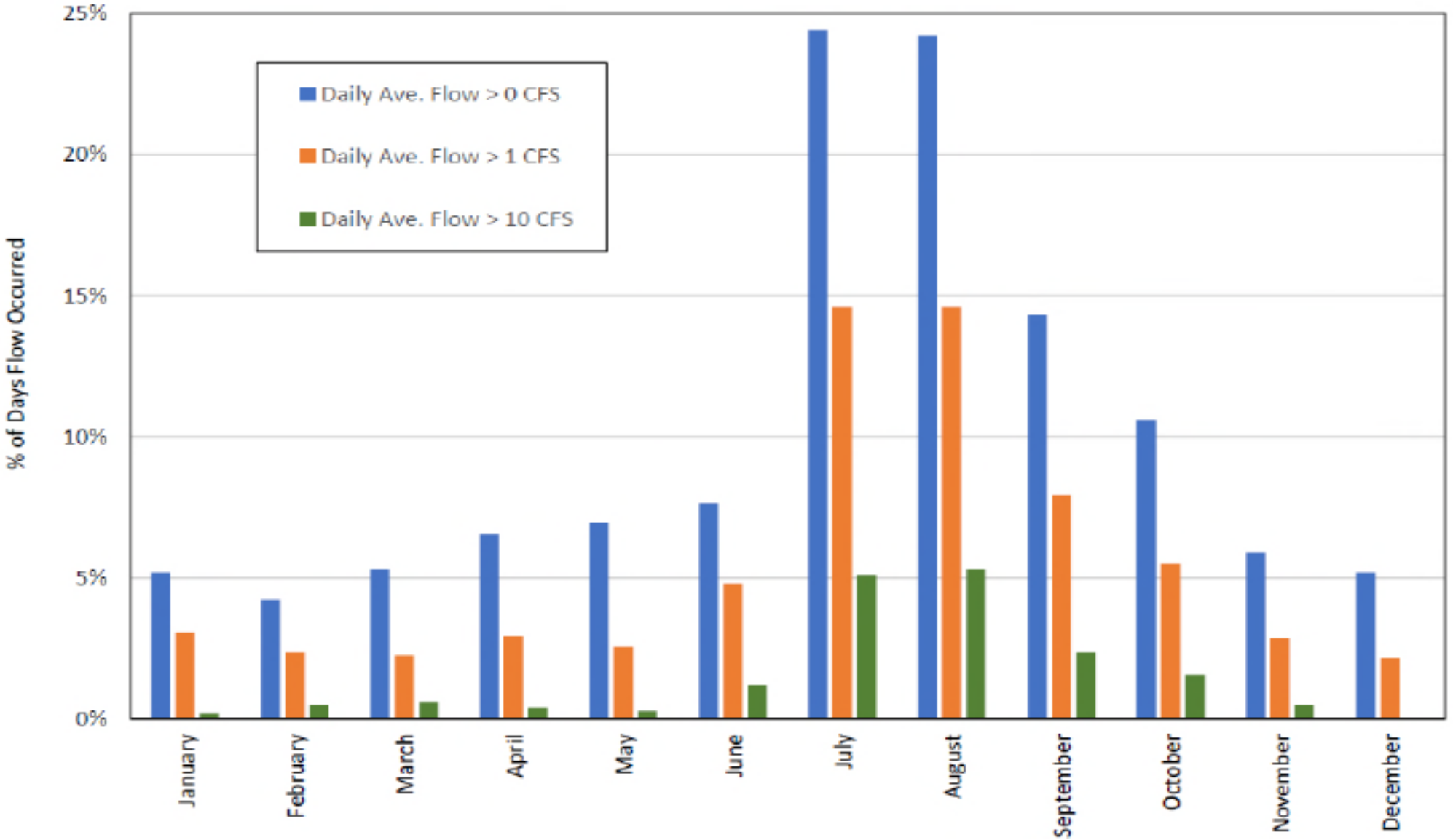
Data are available from only one flow gauge within the reach—the United States Geologic Survey (USGS) Station 08330600 in Tijeras Arroyo ~1.5 miles upstream rom the Rio Grande.

The average annual flow at USGS station 08330600 is approximately 0.38 cfs. The annual average flow of the Rio Grande at USGS station 08330875 (near Isleta Lakes) is roughly 700 cfs.

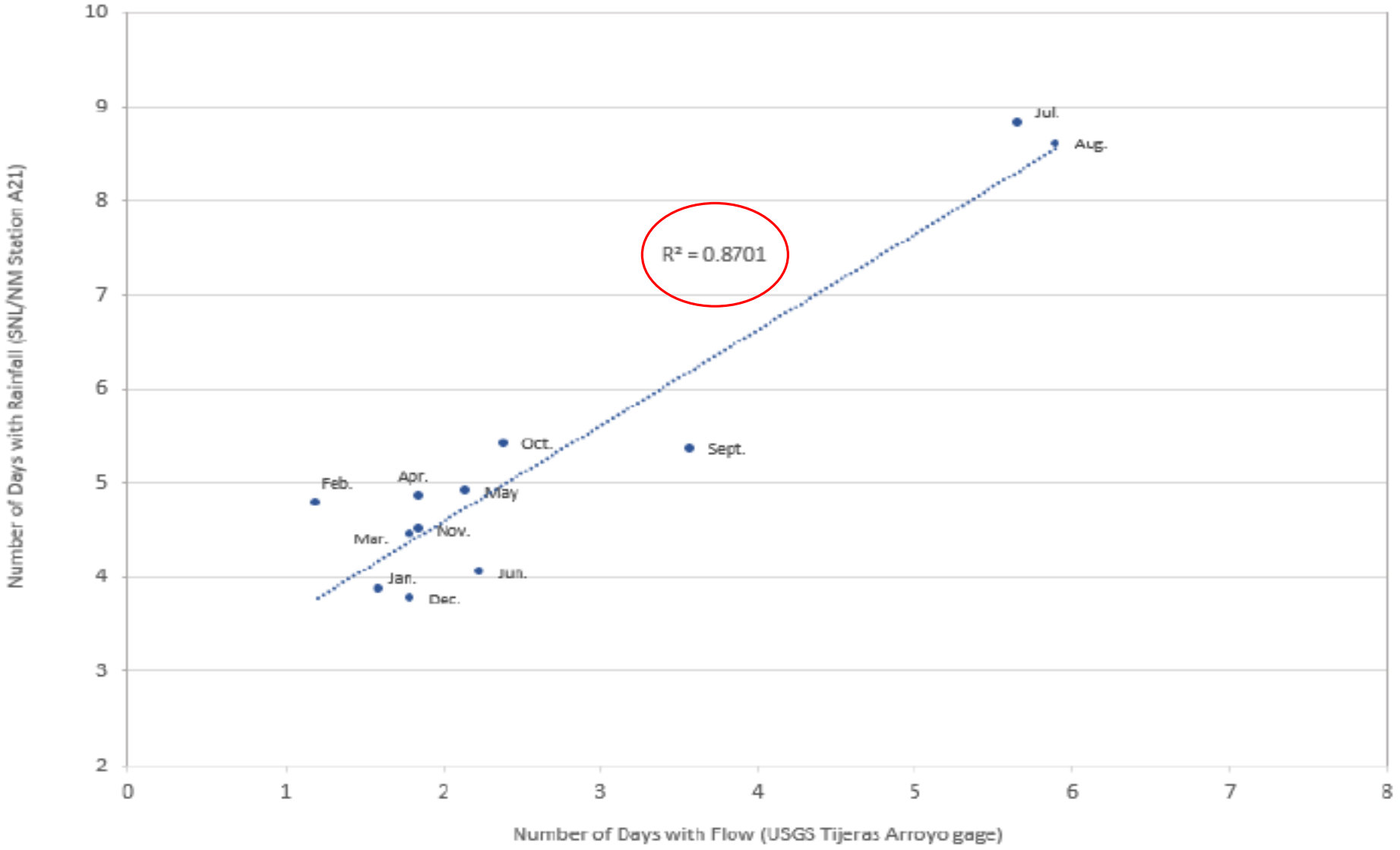
Tijeras Arroyo contributes about 0.05% of the flow in the Rio Grande below Tijeras Arroyo.

It is very unlikely that Tijeras Arroyo has or will in the future have, any significant impact on flow volume or water quality within the Rio Grande.

Surface Water Flow Frequency



Surface Water & Precipitation Correlation



Surface Water Quality

Parameter	Units	Tijeras Arroyo		Rio Grande	
		Average	Samples	Average	Samples
pH	S.U.	6.64	12	7.24	12
Conductivity	µmhos/cm	197.83	12	344.26	12
Temperature	°C	18.76	12	18.13	12
Dissolved Oxygen	mg/L	6.09	12	7.08	12
Biochemical Oxygen Demand	mg/L	24.65	6	3.95	5
Chemical Oxygen Demand	mg/L	107.50	6	30.46	7
Total Suspended Solids	mg/L	14,303.33	6	1,089.33	8
Total Dissolved Solids	mg/L	362.50	8	301.44	8
Total Nitrogen	mg/L	16.44	9	2.06	8
Total Kjedahl Nitrogen	mg/L	11.18	9	1.93	7
Nitrate plus Nitrite	mg/L	3.76	7	0.67	5
Ammonia	mg/L	0.00	1	0.00	0
Total Phosphorous	mg/L	10.03	6	1.03	8
Dissolved Phosphorous	mg/L	0.37	5	0.36	8
Dissolved Copper	µg/L	4.04	8	1.63	7
Dissolved Lead	µg/L	7.20	3	0.58	4
Mercury	µg/L	0.15	10	0.03	10
E. coli	CFU/100 mL	1,725.83	10	4,131.58	14
Oil and Grease	mg/L	8.15	2	0.00	0
Hardness (as $CaCO_3$)	mg/L	151.25	8	154.55	10
Gross Alpha	pCi/L	15.78	4	22.53	6

<u>USGS Stream Gage Data</u>

No data in EPA Water Quality Portal via the Water Quality Exchange

Data obtained from AMAFCA/USGS

Tijeras Arroyo Gage 08330600
Rio Grande Gage 08330875

TSS, metals, and nutrients higher in Tijeras Arroyo.

Based on the low contribution of flow to the Rio Grande, Tijeras Arroyo impact is minimal to non-detectable.

FIELD SURVEYS

Field Surveys

Surveys conducted using the Hydrology Protocol:

- NMED method developed specifically to aid in differentiating intermittent and ephemeral water bodies.

- 14 factors related to the hydrological, geomorphic, and biological indicators of the persistence of water:
  - Presence of water
  - Presence of fish
  - Presence of benthic macroinvertebrates, iron inducing bacteria, fungi
  - Presence of riparian vegetation, algae,
  - Morphology- channel dimensions, floodplain, in-channel structures, sinuosity, sediment size/sorting

- Uses a numeric scoring system:
  - A score above 12 (on a scale of 0-37.5) is considered an indication of intermittent conditions.
  - A score between 9 and 12 is considered to be a gray area requiring additional characterization.
  - A score of 9 or less is considered an indication of ephemeral conditions.

Example Hydrology Protocol Scoring Sheet

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date:	**Stream Name:**	**Latitude:**
Evaluator(s):	**Site ID:**	**Longitude:**
TOTAL POINTS: *Stream is at least intermittent if ≥ 12*	**Assessment Unit:**	**Drought Index (12-mo. SPI Value):**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES ___ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES ___ NO **Diversions** ___ YES ___ NO **Discharges** ___ YES ___ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	**STREAM CONDITION**			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	**4**	**2**	**0**
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	**2**	**1**	**0**

Field Surveys

NTESS conducted the field surveys between June 17–28, 2019.

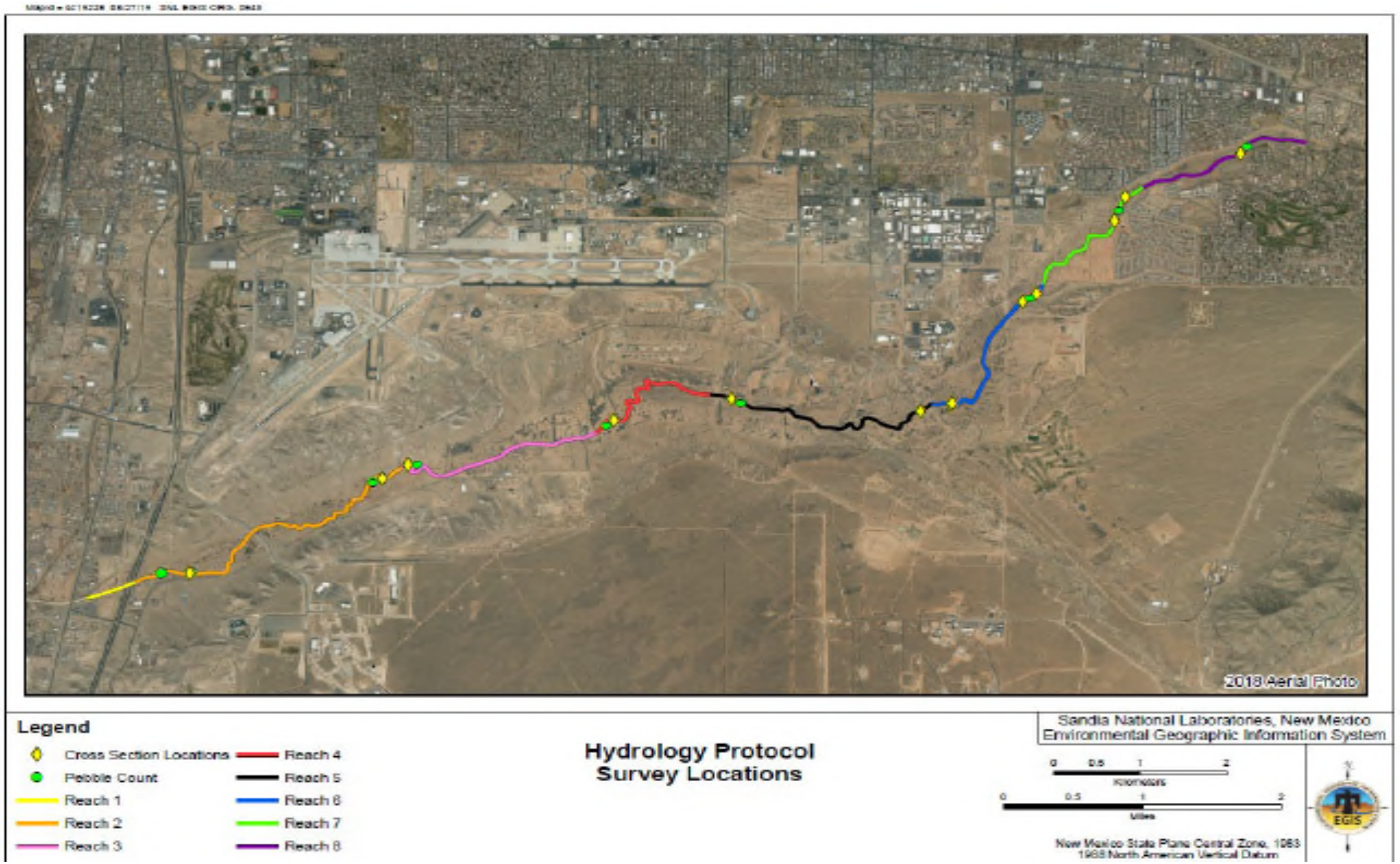
- NMED staff were present during surveys to observe and confer with NTESS staff
- The Rio Grande to Four Hills Bridge reach was divided into eight sub-reaches
- Each sub-reach is approximately one mile long
- Each sub-reach was scored individually and then an average for the entire reach was calculated.

- The highest score for a single sub-reach was 8.5
- The lowest score for a single sub-reach was 5.5
- The average score for the entire reach was 6.1

For reference, NMED determined a score of 3.0 for their test case in 2009.

HP surveys provide a strong indicator that Tijeras Arroyo exhibits characteristics of an ephemeral stream.

Field Survey Locations



Summary of Hydrology Protocol Results

Level 1 Indicator	Sub-reach 2	Sub-reach 3	Sub-reach 4	Sub-reach 5	Sub-reach 6	Sub-reach 7	Sub-reach 8	Average
1.1 Water in channel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.2 Fish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.3 Benthic macroinvertebrates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.4 Filamentous algae/periphyton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.5 Differences in vegetation	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
1.6 Absence of rooted upland plants	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
1.7 Sinuosity	1.0	1.5	2.0	1.0	1.0	1.0	1.0	**1.2**
1.8 Floodplain and channel dimensions	1.5	1.0	1.5	1.0	0.0	3.0	1.0	**1.3**
1.9 In-channel structure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.10 Particle size and sorting	0.0	0.0	1.5	1.0	0.0	0.0	1.5	**0.6**
1.11 Hydric soils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.12 Sediment on plants and debris	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
1.13 Seeps and springs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
1.14 Iron-oxidizing bacteria/fungi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total[1]	**5.5**	**5.5**	**8.0**	**6.0**	**4.0**	**7.0**	**6.5**	**6.1**

[1] A total score of less than 9 is considered to be an indicator of ephemeral conditions. A total score between 9 and 12 is considered borderline. A total score of 12 or greater is considered to be an indicator of intermittent conditions.

Strongest indicators of intermittent conditions:

- Sinuosity
- Floodplain and channel dimensions
- Scale of 0-3 for both

Strongest indicators of ephemeral conditions:

- No water in channel
- No fish
- No benthic macroinvertibrates
- No algae/bacteria/fungi

The HP is pretty conservative, a score of 9 is a pretty strong indicator of ephemeral conditions. A score of 6.1 is a very strong indicator.

Stream Channel Modifications and Impacts

Reach 8:

1. Four Hills Road bridge crossing
2. concrete drop structure immediately downstream of Four Hills Bridge
3. loose concrete rip-rap bank on both sides of the channel for most of the sub-reach
4. concrete bank on the south side of the channel

Reach 7:

5. bridge/road crossing and associated channel
6. encroachment on the north side of the channel from landfill
7. concrete bank on the south side of the channel

Reach 6:

8. concrete road crossing and low-flow diversion beneath the road
9. dirt road crossing

Reach 5:

10. bridge and associated channel
11. encroachment on the north side of the channel from landfill
12. concrete drop structure

Reach 4:

13. bridge
14. stabilized channel for bank and structure protection

Reach 3:

15. concrete drop structure
16. concrete drop structure

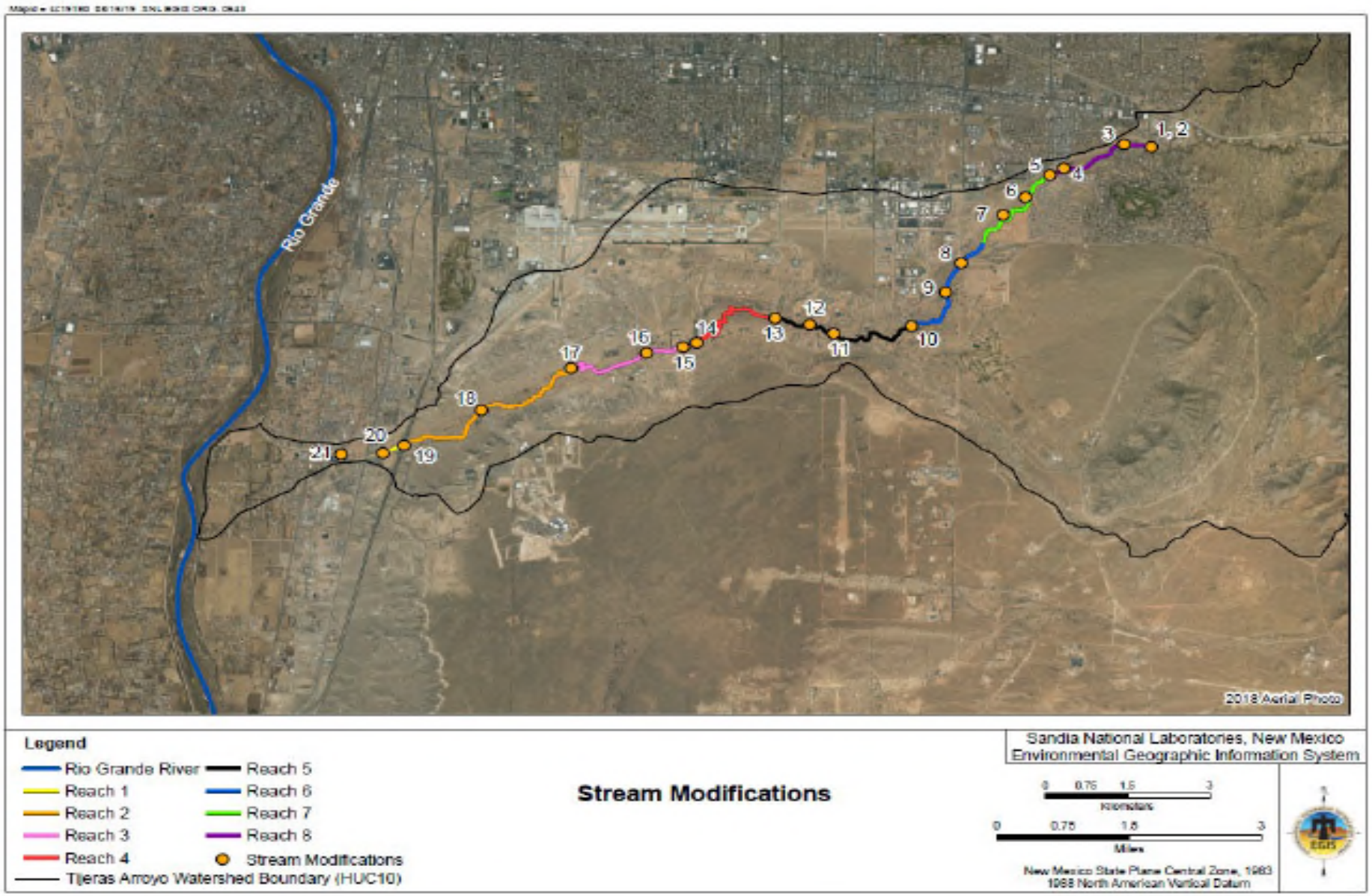
Reach 2:

17. grading to stabilize the bank layback
18. paved road crossing
19. bridge and associated channel

Reach 1:

20. I-25 bridge and associated channel stabilization
21. concrete arroyo ~2 miles long from Rio Grande

Stream Modifications



Photos of Tijeras Arroyo



Sub-reach 2: view of channel looking downstream (west) at the I-25 Bridge.



Sub-reach 2: view of channel looking upstream (east) from the I-25 Bridge.

Photos of Tijeras Arroyo



Sub-reach 2: view of channel looking downstream (west) near top of the sub-reach.



Sub-reach 2: collapsed sanitary sewer from ca. 1980 due to terrace wall erosion.

Photos of Tijeras Arroyo



Sub-reach 3: view of channel looking upstream at the bottom of the sub-reach.



Sub-reach 3: view of channel looking upstream near middle of the sub-reach.

Photos of Tijeras Arroyo



Sub-reach 4: view of channel looking downstream near bottom of the sub-reach.



Sub-reach 4: marking transect location and bank full locations for survey team

Photos of Tijeras Arroyo



Sub-reach 6: looking upstream near bottom of reach.



Sub-reach 6: looking upstream near middle of the reach.

Photos of Tijeras Arroyo



Sub-reach 7: looking down stream near middle of reach at collapsed wastewater line from ca. 1980 and temporary sediment dam created to protect construction project.



Sub-reach 8: looking upstream from the south bank near bottom of reach.

Conclusions of the UAA Study

The Rio Grande to Four Hills Bridge reach of Tijeras Arroyo supports the attainable designated uses and characteristics consistent with an ephemeral water body.

Conditions preventing intermittency:

1. Thick sequence of highly permeable sediments
2. Deep water table
3. High infiltration rate soils
4. Low precipitation

Highest Attainable Designated Uses

Water Type	Designated Use	Description
Ephemeral **(NMAC 20.6.4.97)**	Livestock watering	Can be used as a water supply for livestock
	Wildlife habitat	Can be used by plants and animals
	Limited aquatic life	Can support limited aquatic life specifically adapted to rapidly changing environmental conditions
	Secondary human contact	Can support activities involving human contact where risk of ingestion is minimal

Current Designated Uses

Water Type	Designated Use	Description
Intermittent **(NMAC 20.6.4.98)**	Livestock watering	Can be used as a water supply for livestock
	Wildlife habitat	Can be used by plants and animals
	Marginal warmwater aquatic life	Can support limited aquatic life on a continuous annual basis
	Primary human contact	Can support activities involving prolonged and intimate human contact involving considerable risk of ingestion

Factors Preventing Attainment of Current Designated Uses

Item number 2 from 40 CFR 131.10(g):

Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met.

Proposed Designated Use Removals and Additions

Remove:

- Primary Human Contact
- Marginal Warmwater Aquatic Life

Add:

- Secondary Human Contact
- Limited Aquatic Life

Next Steps

Item Number	Activity	Timeline	Requirement or Guidance
1	Submit UAA to Surface Water Quality Bureau for review	Following completion of the UAA	• 20.6.4.15.D NMAC
2	Hold 60-day public comment period for UAA Conduct Stakeholder Meetings as requested	coordinated with NMED following UAA submittal	• 40 CFR 131.20 • State of New Mexico Statewide Water Quality Management Plan and Continuing Planning Process (WQMP/CPP)
3	Hold a public meeting	Approximately 30 days after the start of the public comment period	• 40 CFR 25.6 • WQMP/CPP
4	Respond to comments (EPA, SWQB, and public) and revise UAA	Within 30 days of the end of the public comment period	• WQMP/CPP
5	Petition WQCC to be placed on the agenda to request a public hearing with a proposed date for such hearing	Within 60 days of the end of the public comment period, after responding to comments	• 40 CFR 131.20 • 20.1.6.200 NMAC • NM WQA 74-6-6.A NMSA 1978 • WQMP/CPP
6	Publish the hearing notice published in the New Mexico Register	At least 60 days prior to the hearing	• 20.1.6.201 NMAC • NM WQA 74-6-6 NMSA 1978 • WQMP/CPP
7	Send the hearing notice to other interested parties	At least 60 days prior to the hearing	• 20.1.6.201 NMAC • NM WQA 74-6-6 NMSA 1978
8	Have a hearing with oral testimony, presentation of exhibits, and cross-examination	Day of the hearing	• 20.1.6.300-302 NMAC • NM WQA 74-6-6.A NMSA 1978 • WQMP/CPP
9	Receive the WQCC deliberation and decision of the proposed rule	Up to 60 days following the hearing	• 20.1.6.306 NMAC • NM WQA 74-6-4.E NMSA 1978 • WQMP/CPP

Thank you for Participating

Obtaining Information

Documents related to the UAA will be available online through the University of New Mexico Digital Repository website at https://digitalrepository.unm.edu/snl_tijeras_arroyo/.

Additional documents related to environmental compliance, monitoring, and stewardship are available through the Sandia National Labs, New Mexico, website at https://www.sandia.gov/about/environment/.

Additional documents may be available online or requested through the Department of Energy FOIA website at https://www.energy.gov/management/foia-reading-room or by emailing a request to envinfo@sandia.gov.

For other documents, please review the information available at the National Nuclear Security Administration Freedom of Information Act (FOIA) website at https://www.energy.gov/nnsa/freedom-information-act-foia.

Providing Comments

Public comments can be made directly to NTESS and DOE via the SNL environmental website at https://www.sandia.gov/about/environment/, and via e-mail to envinfo@sandia.gov.

Public comments can be made directly to NMED via the public comment portal at https://nmed.commentinput.com/comment/search.