

EROSION ON THE JICARILLA LARGO CANYON WATERSHED STUDY

Presented by:

The Jicarilla Oil & Gas Administration



OIL & GAS ADMINISTRATION

JICARILLA APACHE NATION

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November 30, 2018

Jicarilla Apache Nation Request for Funding Largo Canyon Watershed Study, Including Mapping, Engineering & Construction of the Roads to access the Oil Fields

Introduction: The Nation is on the front-end of developing its Oil and Gas Resources and this next generation of O&G wells, based on horizontal drilling and hydraulic fracking to the Mancos Shale, will lead to increased revenues for the Nation and the State of New Mexico. This funding request to the State of New Mexico through the State Legislature is necessary to develop the Nation's Oil and Gas Resources by addressing acute problems we have with erosion and damage to the Nation's Roads.

1. The Watershed study as proposed would initially be a surficial mapping effort to identify deposits in arroyos and basins as well as bedrock units that may be prone to mobilization during intense storm events within the Largo Canyon watershed. Both arroyo erosion and excess sedimentation are problems that occur in the aftermath of a single storm, but the former presents a more immediate threat to infrastructure on the Reservation, the latter affecting downstream communities. Two of the important products of this study will be a surficial geologic map and a hazards map identifying areas at risk of low to extreme erosion.
2. The Watershed study would be conducted by the New Mexico Bureau of Geology and Mineral Resources' Geologic/Hazards Mapping Program. The land to be studied is approximately 500,000 acres and includes the mountains east of the Reservation (approximately 10% of the study area) extending to the Continental Divide north and east of Lindrith. The remainder of the study area consists of wide valleys interspersed with low-lying mesas and buttes. See accompanying map.

We anticipate that the watershed study will be completed within two years, and provide the foundation for engineering studies to mitigate the identified hazards. Engineering and construction activities are to be started in the second year and continue into subsequent years as funding allows.

3. The Bureau anticipates that this level of effort would require a team of 2-3 researchers. The researchers will undertake the following activities:
 - i) conduct mapping through field visits and remote sensing;
 - ii) develop field descriptions of each map unit;
 - iii) perform GPS surveys of areas with extreme erosion;
 - iv) determine erosion and sedimentation rates using low-cost field techniques;
 - v) collect & submit radiocarbon age samples to better understand the history of erosion and sedimentation; and
 - vi) conduct laboratory analyses of texture and other pertinent sediment/bedrock properties. The Bureau team will also include a GIS Analyst who will provide support to the researchers in the form of data acquisition and interpretation.

4. The Watershed study would benefit the Nation and the State of New Mexico by providing state-of-the-art geologic interpretations, GIS data identifying the distribution of surficial and bedrock units, drainage catchments spatially related to Tribal infrastructure, and interpretations of areas prone to geologic hazards like flooding, gully formation, debris flows, and landslides. In addition to satisfying the direct infrastructure needs of the Nation, this work will also facilitate mitigation in regions where similar patterns of arroyo erosion and sedimentation exist.

5. The Watershed study will provide the Nation with GIS information for planning O&G lease roads, silt trapping ponds/impoundments, other water diversions, and a map of the hazards described above classified by severity across the southern part of the Reservation.

At a minimum, GIS products will include:

- i) watershed map;
- ii) slope map;
- iii) longitudinal profile of Cañon Largo-Cañada Larga, the study area's largest drainage;
- iv) surficial geologic map; and
- v) hazard map with areas delineated by low, moderate, and high hazard for flooding, gully formation, debris flows, and landslides.

6. **The Watershed study will also benefit communities west (downstream)** of the Reservation. The downstream communities on the western side of the Reservation are impacted by sedimentation, caused by high intensity storms, that also threatens rivers and fisheries along the San Juan River Basin, impacting endangered species.

7. This funding request is also intended to engineer and design a solution(s) to problems identified through geologic mapping and hazard characterization in the Watershed study. We need to study the source of the problem and then develop an engineering plan for the solution by contracting with the Mineral Engineering Department of New Mexico Tech to better understand technologies to stabilize soils in large precipitation events and to engineer impoundments to minimize sediment mobilization.

8. The actual construction of erosion and sedimentation solutions will be performed by Tribal Departments, Contract and Tribal Roads department, utilizing the monies from this funding request.

9. **This work will cost over a million dollars;** however, we expect significant in-kind work to supplement the cost for this program. The funding request for the Watershed study, mapping, engineering, and construction is one million dollars roughly allocated as follows: i) 20% for the Watershed study and mapping; ii) 30% for engineering; iii) 35% for construction; and iv) 15% for contingencies and overhead. We anticipate completion of the project within three years, just as the oil and gas development will become most active.

Contact Persons are as follows:

1. Guillermo DeHerrera, Director, Jicarilla Oil and Gas Administration; 575.419.0311
2. J. Michael Timmons, Associate Director for Mapping Programs / Deputy Director
New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech, Socorro, NM. 87801; [575 835-5237](tel:5758355237) office

If there are any questions regarding this request, please feel free to contact Guillermo or Mike directly.

On behalf of the Jicarilla Apache Nation,

Sincerely, /s/ Guillermo DeHerrera, Director Jicarilla Oil and Gas Administration

Cc: JAN President, Mr. Levi Pesata











City of Bloomfield

June 25, 2018

Representative Paul Bandy
Representative James Strickler
Senator Steve Neville
Senator William Sharer

Dear Legislators,

The City of Bloomfield has its share of challenges regarding silt and sand entering the San Juan River.

The Jicarilla Apache Nation's Oil and Gas Administration is seeking funding from the New Mexico State Legislature for a Water Shed Study in the Largo Canyon water shed, which begins in the east at Lindrith, goes through the Jicarilla Apache Reservation and through Federal lands, emptying into the San Juan River. That results in silt that could impact the City of Bloomfield's water intake facilities.

The funding will include geologic/hydrologic water shed study, engineering and improvements to the drainages to mitigate the erosion the City of Bloomfield and other communities, along with the Jicarilla Apache Nation.

The City of Bloomfield supports the water shed study and appreciates the efforts of the Jicarilla Apache Nation for taking the lead on this critical study. It is our hope that each of you will support the study as well.

Sincerely,

Cynthia Atencio
Mayor
City of Bloomfield