

City of Santa Fe, New Mexico

memo

DATE: 03/30/2021

TO: City Council

VIA:



Jesse Roach, Water Division Director

Shannon Jones

Shannon Jones, Public Utilities Director

FROM:



Alan Hook, Water Resources Coordinator Assistant

SUBJECT: Amendment No. 1 to Contract 20-0231, U.S. Department of the Interior Geological Survey Joint Funding Agreement 20RBCOLL0000002 Terms of Agreement

Background/Summary:

Contract 20-0231, agreed upon by the City of Santa Fe (City) and the U.S. Department of the Interior Geological Survey (USDOI-USGS) with the primary objective of the Joint Funding Agreement (JFA) 20RBCOLL0000002 to investigate post-fire debris flows in the Santa Fe Municipal Watershed with the following three deliverables: Fire and debris flow modeling; Maps, data tables and a final report on probabilities of debris flow modeling and integration into the City of Santa Fe's Hazard Mitigation Plan & Emergency Action Plans for McClure and Nichols Reservoirs.

Unfortunately, due to Covid-19 protocols for USGS Field Office staff implementation of this project needed to be delayed. Now, USGS staff is able to mobilize with an amendment of the JFA Commencement/Expiration date to March 1, 2021 to June 30, 2022. The existing agreement has a Purchase Order #22101219.

Issue and Action:

Staff requests that the governing body review and approve Amendment No. 1 to contract 20-0231 to amend the JFA Commencement/Expiration date to March 1, 2021 to June 30, 2022. The JFA for \$45,325.13, excluding GRT, was budgeted via Water Division Organizational #505381 and Object #510300, MUNIS Contract 33201804 through FY2022. This JFA is established in protocols developed by USGS in Agreements for Cooperative Work with States, Counties, Municipalities, and other Governmental Subdivisions, Form 9-1366 and is consistent with all JFAs that USGS has executed in New Mexico.

City of Santa Fe, New Mexico

memo

Attachments: (3)

Amendment No. 1 to JFA Commencement and Expiration Dates

**Contract Item # 20-0231: Joint Funding Agreement with Summary of Contracts with
Project Proposal**

Letter of Support from Western Governors Association

CC: Maya Martinez, Public Utilities Fiscal Administrator

Marcos Martinez, Senior Assistant City Attorney

ITEM #21-0174

Form 9-1366
(May 2018)

**U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY**

JOINT FUNDING AGREEMENT

Customer #: 2000001474
Agreement#: 20RBCOLL0000002
Project #: RB00CMY
TIN #: 85-6000168
Fixed Cost Agreement Yes

FOR

Debris flow investigations

THIS AGREEMENT is entered into as of the, day of , by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the City of Santa Fe, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation a project to model post-fire debris flows in the Santa Fe Municipal Watershed with the following three program elements: 1) Fire and debris flow modeling - fire behavior modeling, including a range of potential wildfire severity scenarios; debris flow models; using more-accurate, local fire weather, soils data, and updated rainfall probability data; and model the effects of existing and potential future fire and vegetation management on post-fire debris flows, 2) Products and reporting – create maps and data tables of debris flow probabilities for all sub-basins in the Santa Fe Municipal Watershed, sediment volumes, and a final report; and 3) continue to work with City of Santa Fe personnel to determine the management implications of the results that can be incorporated into the City of Santa Fe’s Emergency Action Plan for McClure or Nichols Reservoirs, inform a post-fire flooding mitigation document and a hazard mitigation or emergency warning system (see attached full proposal for details); herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of \$0.00 .

- (a) by the party of the first part during the period

Amount	Date	to	Date
\$0.00	03/1/2021		06/30/2022

- (b) by the party of the second part during the period

Amount	Date	to	Date
\$45,325.13	03/1/2021		06/30/2022

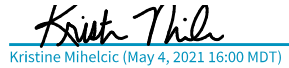
CITY OF SANTA FE:



ALAN WEBBER, MAYOR

DATE: May 3, 2021

ATTEST:



Kristine Mihelcic (May 4, 2021 16:00 MDT)

KRISTINE BUSTOS MIHELICIC, CITY CLERK

GB Mtg 04/14/2021

APPROVED AS TO FORM:



Marcos Martinez (Apr 6, 2021 09:51 MDT)

SENIOR ASSISTANT CITY ATTORNEY 

APPROVED FOR FINANCES:



Alexis Lotero, Acting Finance Director (Apr 30, 2021 16:48 MDT)

MARY MCCOY, FINANCE DIRECTOR



City of Santa Fe

Real Estate Summary of Contracts, Agreements, Amendments & Leases

Section to be completed by department

1. Munis Contract # 3201804

Contractor: USDI USGS

Description: Joint Funding Agreement for 20RBCOLL0000002

Contract Agreement Lease / Rent Amendment

Term Start Date: 4/1/20 Term End Date: 3/23/20

Approved by Council Date: 12/31/21

Contract / Lease: JFA

Amendment # 1 to the Original Contract / Lease # 20-0231

Increase/(Decrease) Amount \$ 0

Extend Termination Date to: Change Term 3/1/21 to 6/30/22

Approved by Council Date: Pending

Amendment is for: Term change

2. **HISTORY of Contract, Amendments & Lease / Rent - Please Elaborate** (option: attach spreadsheet if multiple amendments)
Original Contract #20-0231 \$45,325.13

3. Procurement History: Federal Government Agreement

Fran Dinaway
Fran Dinaway (Apr 29, 2021 1:10 MDT)

Purchasing Officer Review: _____ Date: Apr 29, 2021

Comment & Exceptions: JPA - Exemption 13-1-98 A. Entity to Entity

4. Funding Source: Water Division

Andy Hopkins
Andy Hopkins (Apr 29, 2021 10:50 MDT)

Budget Officer Approval: _____ Date: Apr 29, 2021

Comment & Exceptions: _____

Org / Object: 5050381.510310

Staff Contact who completed this form: Maya Martinez Phone # 4271

Email: mfmartinez@santafenm.gov

To be recorded by City Clerk:

Clerk # _____

Date of Execution: _____

CITY OF SANTA FE OTHER METHOD PROCUREMENT CHECKLIST

Contractor Name: United States Geological Survey (USGS)

Procurement Title: Joint Funding Agreement (JFA) 20RBCOLLO000002

Other Methods: State Price Agreement Cooperative Sole Source Exempt Other Agreement for Cooperative Work with States, Counties, Municipalities, Form 9-1366.

Department Requesting/Staff Member Alan G. Hook

Procurement Requirements:

A procurement file shall be maintained for all contracts, regardless of the method of procurement. The procurement file shall contain the basis on which the award is made, all submitted bids, all evaluation materials, score sheets, quotations and all other documentation related to or prepared in conjunction with evaluation, negotiation, and the award process. The procurement shall contain a written determination from the Requesting Department, signed by the purchasing officer, setting forth the reasoning for the contract award decision before submitting to the Committees. .

REQUIRED DOCUMENTS FOR APPROVAL BY PURCHASING*

- | YES | N/A | |
|-------------------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Approved Procurement Checklist (by Purchasing) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Departments Recommendation of Award Memo addressed to Finance |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | State Price Agreement |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Cooperative Agreement |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Sole Source Request and Determination Form |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Contractors Exempt Letter |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Purchasing Officers approval for exempt procurement |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | BAR |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | FIR |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Contract, Agreement or Amendment |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Current Business Registration and CRS numbers on contract or agreement |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Summary of Contracts and Agreements form |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Certificate of Insurance |
| <input type="checkbox"/> | <input type="checkbox"/> | Other: _____ |

Alan G. Hook, Water Resources Coordinator Assistant

Department Rep Printed Name and Title



Department Rep Signature attesting that all information included

 _____

Purchasing Officer attesting that all information is reviewed

ITEM # 20-0231

Form 9-1366
(May 2018)

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

JOINT FUNDING AGREEMENT

Customer #: 2000001474
Agreement#: 20RBCOLL0000002
Project #: RB00CMY
TIN #: 85-6000168
Fixed Cost Agreement Yes

FOR
Debris flow investigations

THIS AGREEMENT is entered into as of the, day of, by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the City of Santa Fe, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation a project to model post-fire debris flows in the Santa Fe Municipal Watershed with the following three program elements: 1) Fire and debris flow modeling - fire behavior modeling, including a range of potential wildfire severity scenarios; debris flow models; using more-accurate, local fire weather, soils data, and updated rainfall probability data; and model the effects of existing and potential future fire and vegetation management on post-fire debris flows, 2) Products and reporting – create maps and data tables of debris flow probabilities for all sub-basins in the Santa Fe Municipal Watershed, sediment volumes, and a final report; and 3) continue to work with City of Santa Fe personnel to determine the management implications of the results that can be incorporated into the City of Santa Fe’s Emergency Action Plan for McClure or Nichols Reservoirs, inform a post-fire flooding mitigation document and a hazard mitigation or emergency warning system (see attached full proposal for details); herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of \$0.00

(a) by the party of the first part during the period

Amount	Date	to	Date
\$0.00	04/1/2020		12/31/2021

(b) by the party of the second part during the period

Amount	Date	to	Date
\$45,325.13	04/1/2020		12/31/2021

- (c) Contributions are provided by the party of the first part through other USGS regional or national programs, in the amount of: \$0.00

Description of the USGS regional/national program:

- (d) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.
- (e) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.
3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.
4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.
5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.
6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

9-1366 (Continuation)

Customer #:

Agreement #:

- 7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.
- 8. The maps, records or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program, and if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at cost, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records or reports published by either party shall contain a statement of the cooperative relations between the parties.

The Parties acknowledge that scientific information and data developed as a result of the Scope of Work (SOW) are subject to applicable USGS review, approval, and release requirements, which are available on the USGS Fundamental Science Practices website (<https://www2.usgs.gov/fsp/>).

- 9. Billing for this agreement will be rendered.

Quarterly

Invoices not paid within 60 days from the billing date will bear Interest, Penalties, and Administrative cost at the annual rate pursuant the Debt Collection Act of 1982. (codified at 31 U.S.C. § 3717) established by the U.S. Treasury.

**U.S. Geological Survey
United States**

City of Santa Fe

Department of the Interior

USGS Point of Contact

Customer Point of Contact

Name: Kendra Terrell
 Address: FORT Collins Science Center, 2150 Centre Ave.,
 Bldg C, Fort Collins, CO 80526
 Telephone: (970) 226-9217
 Email: kterrell@usgs.gov

Name: Alan G. Hook
 Address: 801. W. San Mateo Rd.
 Santa Fe, NM 87501
 Telephone: (505) 955-4205
 Email: aghook@santafenm.gov

Signatures and Date

Signature: Kendra Terrell
 Digitally signed by Kendra Terrell
 Date: 2020.06.03 09:18:39 -06'00'

Signature: 
 Date: 6-05-2020

Name: Kendra Terrell

Name: ALAN G. HOOK

Title: Finance Specialist

Title: WATER RESOURCES COORDINATOR ASST.

CITY OF SANTA FE:


ALAN WEBBER, MAYOR

DATE: 5/28/2020

CONTRACTOR:
U.S. Department of the Interior

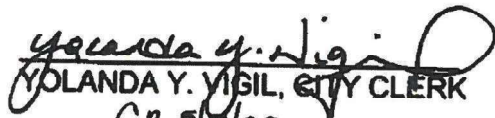
SHARON TAYLOR
NAME & TITLE Sharon K. Taylor, DVM, PhD
Center Director

Digitally signed by
SHARON TAYLOR
Date: 2020.06.04 10:29:22
-06'00'

DATE: _____

CRS #
Business Registration #

ATTEST:


YOLANDA Y. VIGIL, CITY CLERK
GB 5/13/20

APPROVED AS TO FORM:

 3/14/20
SENIOR ASSISTANT CITY ATTORNEY

APPROVED:


MARY MCCOY, FINANCE DIRECTOR

5050381.510300
Business Unit Line Item



**City of Santa Fe
Summary of Contracts, Agreements, & Amendments**

Section to be completed by department for each contract or contract amendment

1 FOR: ORIGINAL CONTRACT or CONTRACT AMENDMENT

2 Name of Contractor USDI/USGS

3 Complete information requested Plus GRT

Original Contract Amount: \$45,325.13

Inclusive of GRT

Termination Date: December 31, 2021

Approved by Council Date: Pending

or by City Manager Date: _____

Contract is for: Joint Funding Agreement for 20RBCOLL0000002

Amendment # _____ to the Original Contract# _____

Increase/(Decrease) Amount \$ _____

Extend Termination Date to: _____

Approved by Council _____

or by City Manager Date: _____

Amendment is for:

4 History of Contract & Amendments: (option: attach spreadsheet if multiple amendments) Plus GRT

Inclusive of GRT

Amount \$ 45,325.13 of original Contract# Pending Termination Date: 12/31/2021

Reason: joint funding agreement

Amount \$ _____ amendment # _____ Termination Date: _____

Reason: _____

Amount \$ _____ amendment # _____ Termination Date: _____

Reason: _____

Amount \$ _____ amendment # _____ Termination Date: _____

Reason: _____

Total of Original Contract plus all amendments: \$ \$45,325.13



**City of Santa Fe
Summary of Contracts, Agreements, & Amendments**

5 Procurement Method of Original Contract: (complete one of the lines)

RFP# _____ Date: _____

RFQ _____ Date: _____

Sole Source _____ Date: _____

Other Governmental Agreement _____

6 Procurement History: 2 years Joint Powers Agreement
example: (First year of 4 year contract)

Fran Dunaway CPO 3/25/25

Purchasing Officer Review

Comments or Exceptions: _____

7 Funding Source: _____ 505 BU/Line Item: _____ 5050381.510310

Budget Officer Approval _____

Comments or Exceptions: _____

8 Any out-of-the ordinary or unusual issues or concerns:

(Memo may be attached to explain detail.)

9 Staff Contact who completed this form: Maya Martinez

Phone # # _____

10 Certificate of Insurance attached. (if original Contract) N/A

**Submit to City Attorney for review/signature
Forward to Finance Director for review/signature
Return to originating Department for Committee(s) review or forward to City Manager for review
and approval (depending on dollar level).**

To be recorded by City Clerk:

Contract # _____

Date of contract Executed (i.e., signed by all parties): _____

Note: If further information needs to be included, attach a separate memo.

Comments:



**City of Santa Fe
Summary of Contracts, Agreements, & Amendments**

Section to be completed by department for each contract or contract amendment

1 FOR: ORIGINAL CONTRACT or CONTRACT AMENDMENT

2 Name of Contractor USDI/USGS

3 Complete information requested Plus GRT
 Inclusive of GRT

Original Contract Amount: \$45,325.13

Termination Date: December 31, 2021

Approved by Council Date: Pending

or by City Manager Date: _____

Contract is for: Joint Funding Agreement for 20RBCOLL0000002

Amendment # _____ to the Original Contract# _____

Increase/(Decrease) Amount \$ _____

Extend Termination Date to: _____

Approved by Council _____

or by City Manager Date: _____

Amendment is for:

4 History of Contract & Amendments: (option: attach spreadsheet if multiple amendments) Plus GRT

Inclusive of GRT

Amount \$ 45,325.13 of original Contract# Pending Termination Date: 12/31/2021

Reason: joint funding agreement

Amount \$ _____ amendment # _____ Termination Date: _____

Reason: _____

Amount \$ _____ amendment # _____ Termination Date: _____

Reason: _____

Amount \$ _____ amendment # _____ Termination Date: _____

Reason: _____

Total of Original Contract plus all amendments: \$ \$45,325.13



City of Santa Fe
Summary of Contracts, Agreements, & Amendments

5 Procurement Method of Original Contract: (complete one of the lines)

RFP# _____ Date: _____

RFQ _____ Date: _____

Sole Source _____ Date: _____

Other Governmental Agreement _____

6 Procurement History: 2 years

example: (First year of 4 year contract)

Purchasing Officer Review

Comments or Exceptions: _____

7 Funding Source: _____ 505 BU/Line Item: _____ 5050381.510310

Andy Hopkins Digitally signed by Andy Hopkins
Date: 2020.03.25 10:22:16 -06'00'

Budget Officer Approval

Comments or Exceptions: _____

8 Any out-of-the ordinary or unusual issues or concerns:

(Memo may be attached to explain detail.)

9 Staff Contact who completed this form: Maya Martinez

Phone # # _____

10 Certificate of Insurance attached. (if original Contract) N/A

Submit to City Attorney for review/signature
Forward to Finance Director for review/signature
Return to originating Department for Committee(s) review or forward to City Manager for review
and approval (depending on dollar level).

To be recorded by City Clerk:

Contract # _____

Date of contract Executed (i.e., signed by all parties): _____

Note: If further information needs to be included, attach a separate memo.

Comments:

PS002036 rcvd 3/16/20

CITY OF SANTA FE OTHER METHOD PROCUREMENT CHECKLIST

Contractor Name: United States Geological Survey (USGS)

Procurement Title: Joint Funding Agreement (JFA) 20RBCOLL0000002

Other Methods: State Price Agreement Cooperative Sole Source Exempt Other Agreement for Cooperative Work with States, Counties, Municipalities, Form 9-1366.

Department Requesting/Staff Member Alan G. Hook

Procurement Requirements:

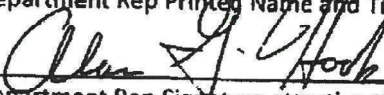
A procurement file shall be maintained for all contracts, regardless of the method of procurement. The procurement file shall contain the basis on which the award is made, all submitted bids, all evaluation materials, score sheets, quotations and all other documentation related to or prepared in conjunction with evaluation, negotiation, and the award process. The procurement shall contain a written determination from the Requesting Department, signed by the purchasing officer, setting forth the reasoning for the contract award decision before submitting to the Committees.

REQUIRED DOCUMENTS FOR APPROVAL BY PURCHASING*

- | YES | N/A | |
|-------------------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Approved Procurement Checklist (by Purchasing) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Departments Recommendation of Award Memo addressed to Finance |
| <input type="checkbox"/> | <input type="checkbox"/> | State Price Agreement |
| <input type="checkbox"/> | <input type="checkbox"/> | Cooperative Agreement |
| <input type="checkbox"/> | <input type="checkbox"/> | Sole Source Request and Determination Form |
| <input type="checkbox"/> | <input type="checkbox"/> | Contractors Exempt Letter |
| <input type="checkbox"/> | <input type="checkbox"/> | Purchasing Officers approval for exempt procurement |
| <input type="checkbox"/> | <input type="checkbox"/> | BAR |
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| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Contract, Agreement or Amendment |
| <input type="checkbox"/> | <input type="checkbox"/> | Current Business Registration and CRS numbers on contract or agreement |
| <input type="checkbox"/> | <input type="checkbox"/> | Summary of Contracts and Agreements form |
| <input type="checkbox"/> | <input type="checkbox"/> | Certificate of Insurance |
| <input type="checkbox"/> | <input type="checkbox"/> | Other: _____ |

Alan G. Hook, Water Resources Coordinator Assistant

Department Rep Printed Name and Title


 Department Rep Signature attesting that all information included

Fran Dunaway 3/25/2020

Purchasing Officer attesting that all information is reviewed

REQUIRED DOCUMENTS FOR OTHER METHOD FILE*

- | YES | N/A | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | State Price Agreement |
| <input type="checkbox"/> | <input type="checkbox"/> | Cooperative Agreement |
| <input type="checkbox"/> | <input type="checkbox"/> | Sole source Request and Determination Form |
| <input type="checkbox"/> | <input type="checkbox"/> | Contractors Exempt Letter |

Purchasing Officers approval of exempt procurement
 Copies of all Sole Source submittals

X Other: Joint Funding Agreement #20RBCOLL0000002

AWARD*

YES N/A

Fully executed Memo to Committees from the Department with recommendation of award
 Other: _____

CONTRACT*

YES N/A

Copy of Executed Contract
 Copy of all documentation presented to the Committees
 Finalized Council Committee Minutes
 Other: _____

Include all other substantive documents and records of communication that pertain to the procurement and any resulting contract.

Create a separate file folder which may contain any documents with trade secrets or other competitively sensitive, confidential or proprietary information.

Alan G. Hook, Water Resources Coordinator Assistant
Department Rep Printed Name and Title

Alan G. Hook
Department Rep Signature attesting that all information included

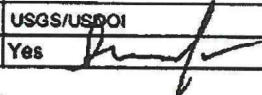
City of Santa Fe FY20 Fiscal Impact Analysis (Non-Personnel Expenditures)



General Information

Department Name:	Public Utilities	Department Name:	PUD
Division Name:	Water Division	Division Name:	Water

Financial Information

Amount Requested:	\$46325.13	Munis Fund Number:	506
Vendor Name:	USGS/USDOI	Munis Org Number:	5050381
Approved by Director?	Yes 	Munis Object Code:	510300

Expenditure Information

1. Describe the purchase of goods/services. Is this one-time or recurring? Please explain why this is the lowest cost option for this expenditure.

The purchase of services is for emergency management planning for post-fire impacts to the City of Santa Fe's municipal watershed and subsequently the municipal reservoirs and water supply. This is the lowest cost option, because a Joint Funding Agreement with the U.S. Geological Survey within the Dept. of Interior provides the greatest value added expertise per dollar for this type of post-wildfire emergency management planning. Furthermore, the USGS has place-based, scientific research found only here within the Santa Fe National Forest and specific to the Santa Fe River Watershed.

2. Please describe which legally required City service does this procurement support? Does this procurement provide support for compliance with City, State and Federal requirements? If yes, please explain.

This City service supports and provides relevant data & information on the threat of wildfire to the City of Santa Fe Hazard Mitigation Plan update, which must be approved by the Federal Emergency Management Agency. Furthermore, this City service will provide an addendum to McClure and Nichols Reservoirs Emergency Action Plans, which are legal requirements under the Office of the State Engineer's Dam Safety Bureau (OSE-DSB). This City service provides support for compliance with the Santa Fe Municipal Watershed Plan under Resolution 2000-87 and support for compliance with the Santa Fe Sustainability Plan for protection of the Greater Santa Fe Watershed.

3. Can these services be performed by City employees in your department or in other departments? If the answer is no, please explain.

No, the City services provided by the scientific experts within the USGS field office and the USGS water science office are specific to wildfire and the post-wildfire effects of flooding and debris flows that cannot be provided within the Water Division or the Santa Fe Fire Department. These scientists have years of experience and knowledge within the Santa Fe National Forest and New Mexico that provides the value added expertise to provide the emergency management planning required to meet Federal, State and City standards.

4. Would there be any adverse health, safety or economic implications if this expenditure was not approved? What impact will there be on the department and the City operations if this expenditure is not approved.

Yes, there would be safety and economic implications if this expenditure was not approved. Not providing the needed emergency management planning for post-wildfire impacts to the City's Hazard Mitigation Plan and the McClure and Nichols Reservoirs Emergency Action Plans would create a safety risk to residents and businesses downstream of our municipal reservoirs. Furthermore, with this City Service, the City can pursue NMED, Source Water Protection funding that can provide an economic stimulus for our Source Water Protection Plan and Emergency Management planning. Also with this City service, in case of a wildfire emergency.

5. If this purchase is not approved with City funds, what are alternative funding sources for the proposed expenditure? Does this duplicate efforts being provided by other governmental, for profit or non-profit entities?

There are no alternative funding sources for this specific, scientific expertise and emergency management planning. This does not duplicate efforts being provided by other governmental entities, like NM Environment Dept. or State Forestry. There are no for profit or non-profit entities providing this service at this lowest cost.

	<i>Alexis Lotero</i>	
Procurement Office Signature	Budget Office Signature	Finance Director Signature

Signature: *Fran Dunaway* CFO

Fran Dunaway, CFO (P) (M) 25. 2010

Email: fadunaway@santafenm.gov

Signature: *Mary McCoy*

Email: mtmccoy@santafenm.gov

Project funding and costs
April 1, 2019 – December 31, 2021

Total funding
\$45,325.13

City of Santa Fe
\$45,325.13

Funding Breakdown by Program Element

Program elements

1. Debris flow and fire modeling

Description	City of Santa Fe funding
Debris flow modeling, fire modeling, and ensemble of fire and weather scenarios for the Santa Fe Watershed	\$ 27,449.08

2. Products and reporting

Description	City of Santa Fe funding
Production of maps, data tables, and final report	\$ 8,913.03

3. Management implications and City Hazard Planning

Description	City of Santa Fe funding
Collaboration with City officials to determine management implications and integration of results into City Hazard Planning	\$ 8,913.03

Post-fire debris flow modeling in the Santa Fe Municipal Watershed

Manuel Lopez and Ellis Margolis – USGS New Mexico Landscapes Field Station, Santa Fe, NM
Anne Tillery – USGS New Mexico Water Science Center, Albuquerque, NM

Executive Summary

Forest fires are increasing in size, severity, and occurrence due to increasingly warmer drought combined with overstocked forests from a century of fire suppression. Not only do fires directly threaten communities, but post-fire flooding and debris flows (a fluid mixture of water, soil, rocks, and logs) pose significant post-fire threats to watersheds, life and property. High- and moderate-severity forest fires increase the likelihood of debris-flows by removing forest canopies that otherwise would intercept precipitation, by generating ash, and forming water-repellent soils that decrease infiltration and increase runoff and erosion. Probabilities of debris-flow occurrence and volume can be estimated using empirical models for different rain and fire scenarios. **Preliminary modeling of post-fire debris flows in the Santa Fe Watershed indicate the potential for damaging and dangerous debris flows after just a moderate-severity fire followed by a relatively common rain event for the region.** A small event would produce enough sediment to block emergency water-release valves, whereas a large event could fill a large portion of the reservoir and increase the risk of downstream flooding and dam failure. Observations from nearby drainages in New Mexico (e.g., Nambe, Frijoles, and Santa Clara) and around the West (e.g., California) suggest that high-severity fires followed by potentially life-threatening debris flows are more likely in forested areas and therefore the risk of post-fire debris flows should be considered in hazard planning.

This study will address two fundamental questions in post-fire debris-flow hazard assessment: where might post-fire debris flows occur and how big might they be? We propose to generate a series of geographic information system produced maps and accompanying data that estimate the probability and volume of post-fire debris flows for the upper Santa Fe Municipal Watershed (SFMW) given a 1, 10, 20, and 50-year, 30-minute rainfall events following low to moderate to high severity wildfire. We hypothesize debris-flow potential would correlate with increasing fire severity and rainfall precipitation given slopes greater than 30%. Burn severity will be simulated with low fuel moistures and windy conditions common to the region in the early summer that would likely result in moderate to high severity fire in the untreated portions of the watershed. We anticipate sub-basins with prior forest treatments will yield the lowest burn severities as well as the lowest debris-flow probabilities and estimated sediment volumes for each model storm. Results and implications from this work can help inform city planners and forest managers, and give them an opportunity to prepare and mitigate potential negative effects associated with wildland fire and subsequent debris flows.

We propose to improve our initial models of post-fire debris flows in the Santa Fe Municipal Watershed in three ways: 1) improved and more realistic fire behavior modeling, including a range of potential wildfire severity scenarios, 2) improved debris flow models, and 3) using more accurate, local fire weather, soils data, and updated rainfall probability data. Products would include debris flow sediment volume and debris flow probability for all sub-basins. Additionally, we propose to model the effects of existing and potential future fire and vegetation management on post wildfire debris flows.

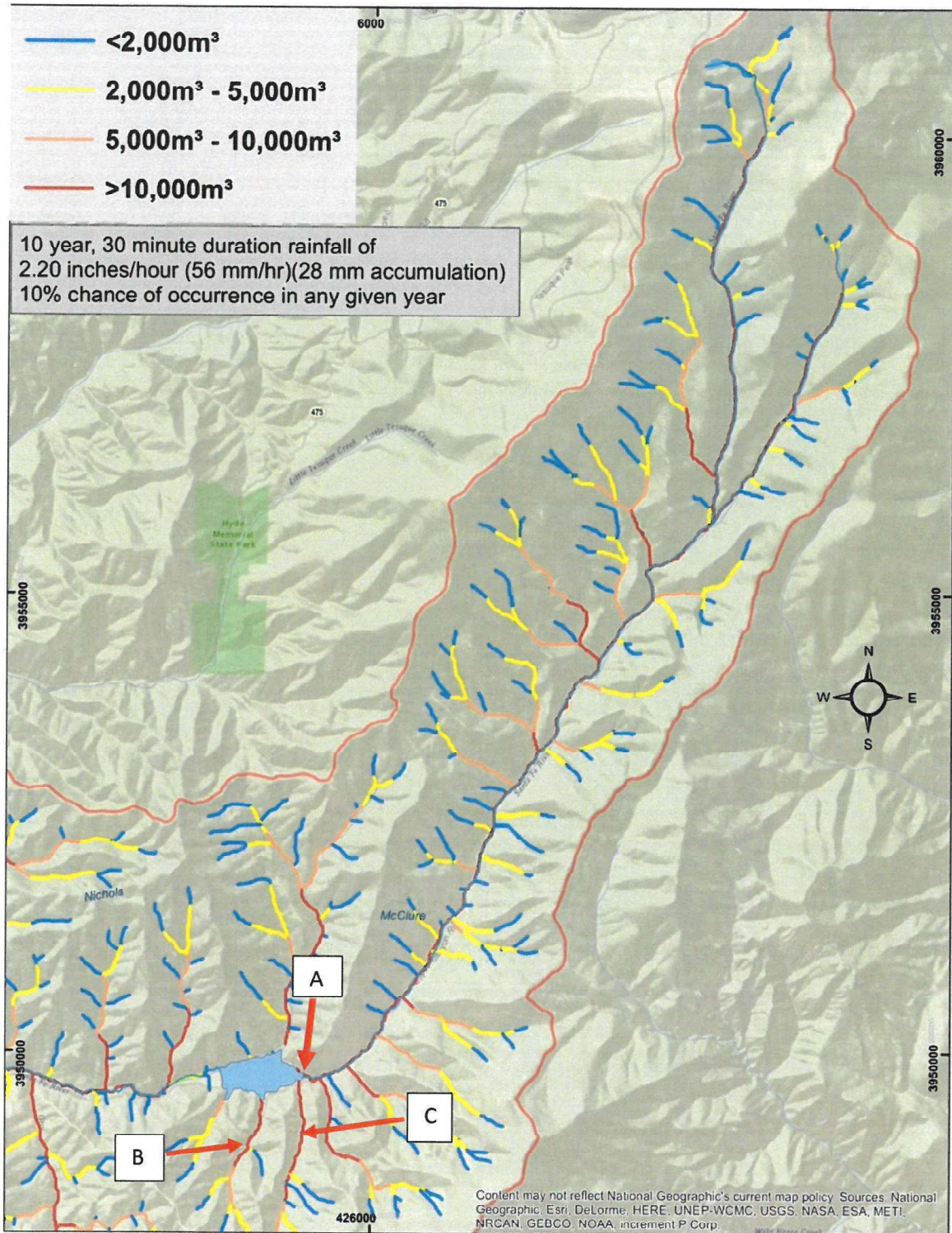


Figure 1. Modeled post-fire debris flow volumes in the Santa Fe Watershed for individual stream reaches and sub-basins (colored lines) and three input points into McClure Reservoir (A - C). Debris flow estimates are based on a 10-year storm (2.2 inches/hour) and a moderate-severity fire. Point A is the main stream channel (Santa Fe River above McClure), and B and C represent two rugged sub-basins south of McClure Reservoir deemed "untreatable". Estimate debris volumes are: A- 1,580,194m³; B and C combined - 31,125m³. Both of these debris flow volumes would cover the emergency valve in McClure and just the input from the Santa Fe River would fill 40% of McClure reservoir with debris.

Methods

Two empirical models will be used to estimate probability, volume, and combined relative hazard. Research by Cannon and others (2010) and Verdin and others (2012) have analyzed numerous post wildfire basin locations in the intermountain western United States. They have created different empirical models derived from the statistical evaluation of numerous burned basins and used it to create probability of debris flows and estimation of debris-flow volume in a given drainage basin influenced by fire. The models were designed to be utilized in a geographic information system (GIS) by managers prior to or after a wildfire event.

PROBABILITY MODEL

The regression equation for debris-flow probability is:

$$P = \frac{x}{1 + x}$$

Where: P is the probability of debris-flow occurrence in fractional form;

And $x = -0.7 + 0.03(\%SG30) - 1.6(R) + 0.06(\%AB) + 0.07(I) + 0.2(\%C) - 0.4(LL)$;

- Where: %SG30 is the percentage of the drainage-basin area with slope equal to or greater than 30% (using 10-m digital elevation models) (Gesch et al. 2002);
 - R is drainage-basin ruggedness: the change in drainage-basin elevation (meters) divided by the square root of the drainage-basin area (square meters) (Melton 1965);
 - %AB is the percentage of drainage-basin area burned at moderate to high severity
 - I is average storm intensity (calculated by dividing total storm rainfall by the storm duration, in millimeters per hour) (Bonnin et al. 2006)
 - %C is clay content of the soil (percent) (State Soil Geographic dataset [STATSGO]); Schwartz and Alexander 1995); and
 - LL is the liquid limit of the soil (percentage of soil moisture by weight)
- Probabilities predicted by the equation potentially ranged from 0 (least likely) to 100 percent (most likely). The predicted probabilities are assigned to 1 of 5 equal (20 percent) interval classes for cartographic display.

VOLUME MODEL

The debris-flow volume estimates for both the basin outlet and along the drainage network are predicted using multiple linear regression models for region-specific databases. These are used to estimate the volume (m³) of eroded material emanating from drainage outlets along the stream network during a certain rainfall intensity. The volumetric outputs of the equation have four classes in order of magnitude with ranges of 0-2,000 m³; 2,000-5,000 m³; 5,000-10,000 m³; and greater than 10,000 m³. This classification is displayed with a color scheme per stream segment. Cannon and others (2010) developed an empirical model for the estimation of debris-flow volume following a wildfire and a given storm event. The equation is:

$$\ln(V) = 7.2 + 0.6(\ln SG30) + 0.7(AB)0.5 + 0.2(T)0.5 + 0.3$$

- Where: V is the debris-flow volume, including water, sediment, and debris (cubic meters);
- SG30 is the area of a drainage basin with slopes equal to or greater than 30 percent (square kilometers);
- AB is the drainage-basin area burned at moderate to high severity (square kilometers);

- T is the total storm rainfall (millimeters);
- and 0.3 is a bias-correction factor that changes the predicted estimate from a median to a mean value.

COMBINED HAZARD

After segment debris-flow probability and potential volume are calculated, identification of debris-flow probability and volume at the sub-basin level is generated. Using the field calculator in ArcGIS, the above equations are used to create a debris-flow hazard index per sub-basin (Table 1).

	Probability					
Volume	Rank	1	2	3	4	5
	1	2	3	4	5	6
	2	3	4	5	6	7
	3	4	5	6	7	8
	4	5	6	7	8	9

Table 1. Hazard ranking system

The most hazardous basins include a combination of high debris-flow probability of occurrence and large potential volume of eroded material. Basins with a lower hazard index will contain an offset of the two factors, either lower probabilities with high potential volumes, or high probabilities with low potential volumes. The least hazardous basins will include those that contain both low probabilities and low potential volumes. Cannon and others (2010) outlined the methods necessary for hazard calculation. For each debris-flow probability class, a ranking was assigned from 1 to 5 in ascending order, and an ascending rank of 1 to 4 for the volumetric classes. When ranks from both classes were added together the sub-basins displayed their relative hazard ranking in a cartographic map (in ascending order, with 9 representing the most hazardous).

Fire Behavior Modeling

To execute the debris-flow model in an area which has not recently experienced fire we need to estimate or model the burn severity. Keeley (2009) defines burn severity as a measure of changes in vegetation cover from pre-wildfire to post-wildfire. This is represented as a percentage of area burned at varying severities in the basin for both debris-flow probability and volume estimation. In regard to forest canopy, a moderate severity burn will scorch only a portion of the tree canopy, but not consume all of its needles. A high severity fire will completely burn and kill over story tree canopy as well as consume most if not all surface litter (Keeley 2009).

A burn severity raster will be computed using Finney’s (2006) fire mapping and analysis program FlamMap. FlamMap is a fire mapping and analysis program that describes potential fire behavior based upon environmental conditions such as weather and fuel moisture. Data is extracted from LANDFIRE (Ryan and Opperman 2013), a planning project that allows forest managers in multiple agencies to have

current geospatial data on fuels and terrain. FlamMap imports LANDFIRE data such as slope, aspect, and elevation, and fuels layers such as canopy cover, stand height, canopy base height, canopy bulk density, and fuel-loading (Ryan and Opperman 2013). LANDFIRE fuels data and the FlamMap crown-fire outputs arrive in 30m spatial resolution and have to be resampled to 10m using the nearest neighbor technique (Tillery *et al.* 2014). After a burn severity run is completed (using weather and fuels data) the resulting raster is exported as a .tif file to ArcMap, and a classification scheme created to decipher moderate to high severity (low=0, m-h=1). The burn severity raster will take into account nearby watersheds which have previously burned (e.g. Pacheco Canyon) and their dNBR values in order to model a similar result. This will improve burn severity accuracy with account to similar vegetation.

Statement of Work

We propose to improve upon the preliminary debris flow research conducted by Lopez (2017) within the Santa Fe Municipal Watershed by performing the following:

1. Improved fire modeling

- Updated fuels layers that include recent treatments
- Better fire behavior and fire severity estimates – model runs will be validated and updated using recent nearby fires – e.g., Pacheco or Las Conchas)

2. Improve debris flow modeling

- Modification and improvement of sub-basin delineation per new methods (Staley et al. 2018)
- Better soils data, if available

3. Ensemble of climate (fire & rain) scenarios to provide a range of possible outcomes

- Weather parameters: use the revised, NM-specific probable maximum precipitation data (NWS and NM State Engineer) to pull the 1, 10, 20, and 50-year rain events to model the post-fire flooding.
- Run 3X3 scenarios (permutations), based on low, mod, and high-severity fire (3 scenarios) combined with low, mod, and high return interval rain events (3 scenarios), for a total of 9 scenarios.
 1. High-severity fire + small, med, and large rain event
 2. Moderate-severity fire + small, med, and large rain event
 3. Low-severity fire + small, med, and large rain event

4. Provide data to:

- Address how post-fire debris flow and flooding estimates would be incorporated into the City's Emergency Action Plan (working with David Silver) and inform a post-fire flooding mitigation document.
- Discuss ways of integrating data into hazard mitigation or warning system with City officials.

5. Products:

- Maps:
 - Debris flow probabilities
 - Estimated debris flow volumes per stream segment and per sub basin (e.g., Figure 1)
 - Hazard assessments for specific sub-basins
 - Identify locations with highest estimated debris flow volumes.

- Tables of debris flow volumes for different scenarios
- Discussion and collaboration with the City on what products would help benefit them and hazard mitigation

Budget

Requesting salary for M. Lopez (4.25 months)

Requesting salary for A. Tillery (0.5 months)

Contributing salary for E. Margolis (1 month)

Work	Months	Cost
Improve debris flow modeling	0.75	\$ 3,340.50
Improve Fire Modeling	0.75	\$ 3,340.50
Ensemble of climate (fire & rain) scenarios	0.75	\$ 3,340.50
Products	1	\$ 4,454.00
Writing and Integration with City Hazard Plan	1	\$ 4,454.00
Research design, review, supervision, and editing	0.5	\$ 10,211.00
Total direct cost		\$ 29,140.50
Indirect cost - USGS FORT overhead – non DOI	0.55540	\$ 16,184.63
Total cost		\$ 45,325.13

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City of Santa Fe, New Mexico

memo

Date: March 13, 2020

To: Public Utilities Committee
Finance Committee
City Council

Via: Shannon Jones, Public Utilities Director 
Jesse Roach, Water Division Director

From: Alan G Hook, Water Resources Coordinator Assistant *AGH*

RE: Joint Funding Agreement (JFA) 20RBCOLL0000002 with the U.S. Geological Survey (USGS), United States Department of Interior (DOI) for \$45,325.13 (excluding GRT) to model and investigate post-fire debris flows in the Santa Fe Municipal Watershed.

Background: Forest fires are increasing in size, severity, and occurrence due to increasingly warmer drought combined with overstocked forests. Not only do wildfires directly threaten communities, but post-fire flooding and debris flows (a fluid mixture of water, soil, rocks, and logs) pose significant post-fire threats to watersheds, life and property. With the recent downgrade in the City of Santa Fe's municipal reservoirs safety rating from satisfactory to poor, the urgent need to understand the threat and severity of wildfire upstream and adjacent to the municipal reservoirs, but also the probabilities of debris-flow occurrence and volume that can be estimated using empirical models for different rain and fire scenarios. **Preliminary modeling of post-fire debris flows in the Santa Fe Municipal Watershed indicate the potential for damaging and dangerous debris flows after just a moderate-severity fire followed by a relatively common rain event for the region (see Attachment 3).**

Item: The primary objective of the JFA is to model post-fire debris flows in the Santa Fe Municipal Watershed with the following three program elements:

1) Fire and debris flow modeling - fire behavior modeling, including a range of potential wildfire severity scenarios; debris flow models; using more-accurate, local fire weather, soils data, and updated rainfall probability data; and model the effects of existing and potential future fire and vegetation management on post-fire debris flows, 2) Products and reporting – create maps and data tables of debris flow probabilities for all sub-basins in the Santa Fe Municipal Watershed, sediment volumes, and a final report; and 3) continue to work with City of Santa Fe personnel to determine the management implications of the results that can be incorporated into the City of Santa Fe's Emergency Action Plan for McClure or Nichols Reservoirs, inform a post-fire flooding mitigation document and a hazard mitigation or emergency warning system

Requested Action: Staff is seeking approval of the JFA for \$45,325.13, excluding GRT, which was budgeted in FY2020 via Water Division Organizational #505381 and Object #510300, MUNIS Contract 33201804. The term of the JFA is from April 1, 2020 through December 31, 2021 (City of Santa Fe FY2020-22). This JFA is established in protocols developed by USGS in Agreements for Cooperative Work with States, Counties, Municipalities, and other Governmental Subdivisions, Form 9-1366 and is consistent with all JFAs that USGS has executed in New Mexico.

CC: Maya Martinez, Public Utilities Fiscal Administrator

1/17/2019

Post-fire debris flow modeling in the Santa Fe Municipal Watershed

Manuel Lopez and Ellis Margolis – USGS New Mexico Landscapes Field Station, Santa Fe, NM

Anne Tillery – USGS New Mexico Water Science Center, Albuquerque, NM

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Signature: 
Geraldyn Cardenas (May 3, 2021 09:19 MDT)

Email: gfcardenas@santafenm.gov