Southern Sandoval County Arroyo Flood Control Authority

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December 1, 2017

U.S. EPA, Region 6
Water Quality Protection Division
Operations Support Service (6WQ-O)
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: 2017 Annual Report, NPDES Permit No. NMR04A001

To whom it may concern:

The Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) is pleased to submit the 2016 Annual Report for NPDES Permit No. NMR04A000. SSCAFCA's permit tracking number, as assigned in our letter from EPA "Coverage under Middle Rio Grande (MRG) Watershed Based Municipal Sewer Separate Storm Sewer System General Permit (NPDES No. NMR04A000) is NMR04A001. This report covers the period from July 1, 2016 (the date of the letter from EPA authorizing coverage under NPDES Permit No. NMR04A000) to June 30, 2017.

Materials contained within this transmittal include our Annual Report compiled using the EPA's suggested Annual Report Format, a 2017 Annual Report Supplement, the River Xchange 2017 report, the Summary of Outcomes Report for the Mid Rio Grande Stormwater Quality Team, a profile of water quality projects that have been completed within the reporting period, and memorandums developed on behalf of the Compliance Monitoring Cooperative for the wet season compliance sampling in 2016 and the dry season compliance sampling in 2016-2017. EPA has authorized data entry of sample results for the Compliance Monitoring Cooperative to be entered into NetDMR by a single entity on behalf of other entities. A copy of the memorandum of understanding between SSCAFCA and AMAFCA as well as the letter from EPA authorizing this action are included in this report.

If you have any further questions, please feel free to contact David Gatterman at dgatterman@sscafca.com or at 505-892-7246.

Sincerely,

Charles Thomas, PE
Executive Engineer
SSCAFCA

2017 Annual Report
Reporting Period – July 1, 2016 – June 30, 2017

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Annual Report Format

National Pollutant Discharge Elimination System Stormwater Program

MS4 Annual Report Format

Check box if you are submitting an individual Annual Report with one or more cooperative program elements. ☒

Check box if you are submitting an individual Annual Report with individual program elements only. ☐

Check box if this is a new name, address, etc. ☐

1. MS4(s) Information

Southern Sandoval County Arroyo Flood Control Authority

Name of MS4

David	Gatterman	Environmental Services Director
Name of Contact Person (First)	(Last)	(Title)

505-892-7246	dgatterman@sscafca.com
Telephone (including area code)	E-mail

1041 Commercial Dr. SE

Mailing Address

Rio Rancho	NM	87124
City	State	ZIP code

What size population does your MS4(s) serve? 101,103 NPDES number

What is the reporting period for this report? (mm/dd/yyyy) From Jul 1, 2016 to Jun 30, 2017

2. Water Quality Priorities

A. Does your MS4(s) discharge to waters listed as impaired on a state 303(d) list? ☒ Yes ☐ No

B. If yes, identify each impaired water, the impairment, whether a TMDL has been approved by EPA for each, and whether the TMDL assigns a wasteload allocation to your MS4(s). Use a new line for each impairment, and attach additional pages as necessary.

Impaired Water	Impairment	Approved TMDL		TMDL assigns WLA to MS4	
Rio Grande, HUC 13020203	eColi	☒ Yes	☐ No	☒ Yes	☐ No
Rio Grande, HUC 13020203	PCP in fish tissue	☐ Yes	☒ No	☐ Yes	☒ No
Rio Grande, HUC 13020203	PCB in water column	☐ Yes	☒ No	☐ Yes	☒ No
Rio Grande, HUC 13020203	Gross Alpha	☐ Yes	☒ No	☐ Yes	☒ No

2. B. Continued

Impaired Water	Impairment	Approved TMDL		TMDL assigns WLA to MS4	
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No

C. What specific sources contributing to the impairment(s) are you targeting in your stormwater program?

Pet waste, sediment, floatables, illicit discharges

D. Do you discharge to any high-quality waters (e.g., Tier 2, Tier 3, outstanding natural resource waters, or other state or federal designation)? ☐ Yes ☒ No

E. Are you implementing additional specific provisions to ensure their continued integrity? ☐ Yes ☒ No

3. **Public Education and Public Participation**

A. Is your public education program targeting specific pollutants and sources of those pollutants? ☒ Yes ☐ No

B. If yes, what are the specific sources and/or pollutants addressed by your public education program?

Pet waste, floatables, illicit discharges

C. Note specific successful outcome(s) (e.g., quantified reduction in fertilizer use; NOT tasks, events, publications) fully or partially attributable to your public education program during this reporting period.

See outcomes report from the Middle Rio Grande Storm Water Quality Team

D. Do you have an advisory committee or other body comprised of the public and other stakeholders that provides regular input on your stormwater program? ☐ Yes ☒ No

4. **Construction**

A. Do you have an ordinance or other regulatory mechanism stipulating:

Erosion and sediment control requirements? ☒ Yes ☐ No

Other construction waste control requirements? ☒ Yes ☐ No

Requirement to submit construction plans for review? ☒ Yes ☐ No

MS4 enforcement authority? ☒ Yes ☐ No

B. Do you have written procedures for:

Reviewing construction plans? ☒ Yes ☐ No

Performing inspections? ☒ Yes ☐ No

Responding to violations? ☒ Yes ☐ No

C. Identify the number of active construction sites ≥ 1 acre in operation in your jurisdiction at any time during the reporting period. 3

D. How many of the sites identified in 4.C did you inspect during this reporting period? 2

E. Describe, on average, the frequency with which your program conducts construction site inspections.

All SSCAFCA-owned sites are inspected by SSCAFCA personnel at a minimum weekly. Qualified contractors inspect hte sites at frequencies required in the Construction General Permit.

F. Do you prioritize certain construction sites for more frequent inspections? ☐ Yes ☒ No

If Yes, based on what criteria? All SSCAFCA-owned sites are inspected

G. Identify which of the following types of enforcement actions you used during the reporting period for construction activities, indicate the number of actions, or note those for which you do not have authority:

☐ Yes	Notice of violation		No Authority	☒
☐ Yes	Administrative fines		No Authority	☒
☐ Yes	Stop Work Orders		No Authority	☒
☐ Yes	Civil penalties		No Authority	☒
☐ Yes	Criminal actions		No Authority	☒
☐ Yes	Administrative orders		No Authority	☒
☒ Yes	Other	Contractual mechanisms fo		

H. Do you use an electronic tool (e.g., GIS, data base, spreadsheet) to track the locations, inspection results, and enforcement actions of active construction sites in your jurisdiction? ☐ Yes ☒ No

I. What are the 3 most common types of violations documented during this reporting period?

No violations noted. SSCAFCA has Stop Work authority on SSCAFCA-owned projects.

J. How often do municipal employees receive training on the construction program? As needed

5. **Illicit Discharge Elimination**

A. Have you completed a map of all outfalls and receiving waters of your storm sewer system? ☒ Yes ☐ No

B. Have you completed a map of all storm drain pipes and other conveyances in the storm sewer system? ☒ Yes ☐ No

C. Identify the number of outfalls in your storm sewer system. 8

D. Do you have documented procedures, including frequency, for screening outfalls? ☐ Yes ☐ No

E. Of the outfalls identified in 5.C, how many were screened for dry weather discharges during this reporting period?

8

F. Of the outfalls identified in 5.C, how many have been screened for dry weather discharges at any time since you obtained MS4 permit coverage? 8

G. What is your frequency for screening outfalls for illicit discharges? Describe any variation based on size/type.

All SSCAFCA facilities are inspected at a minimum twice per year (pre and post monsoon) for a condition of facility assessment and evidence of illicit discharge.

H. Do you have an ordinance or other regulatory mechanism that effectively prohibits illicit discharges? ☐ Yes ☒ No

I. Do you have an ordinance or other regulatory mechanism that provides authority for you to take enforcement action and/or recover costs for addressing illicit discharges? ☐ Yes ☒ No

J. During this reporting period, how many illicit discharges/illegal connections have you discovered? 0

K. Of those illicit discharges/illegal connections that have been discovered or reported, how many have been eliminated? 0

L. How often do municipal employees receive training on the illicit discharge program? As needed

6. Stormwater Management for Municipal Operations

A. Have stormwater pollution prevention plans (or an equivalent plan) been developed for:

All public parks, ball fields, other recreational facilities and other open spaces	☐ Yes	☒ No
All municipal construction activities, including those disturbing less than 1 acre	☐ Yes	☒ No
All municipal turf grass/landscape management activities	☐ Yes	☒ No
All municipal vehicle fueling, operation and maintenance activities	☐ Yes	☒ No
All municipal maintenance yards	☐ Yes	☒ No
All municipal waste handling and disposal areas	☐ Yes	☒ No

Other

B. Are stormwater inspections conducted at these facilities? ☐ Yes ☒ No

C. If Yes, at what frequency are inspections conducted? NA

D. List activities for which operating procedures or management practices specific to stormwater management have been developed (e.g., road repairs, catch basin cleaning).

Pre and post-monsoon inspection and cleaning of flood control facilities

E. Do you prioritize certain municipal activities and/or facilities for more frequent inspection? ☒ Yes ☐ No

F. If Yes, which activities and/or facilities receive most frequent inspections?

Dams (with and without water quality features), ponds (with and without water quality features), sediment control facilities

G. Do all municipal employees and contractors overseeing planning and implementation of stormwater-related activities receive comprehensive training on stormwater management? ☒ Yes ☐ No

H. If yes, do you also provide regular updates and refreshers? ☒ Yes ☐ No

I. If so, how frequently and/or under what circumstances?

All technical staff are encouraged to see training on stormwater management.

7. Long-term (Post-Construction) Stormwater Measures

A. Do you have an ordinance or other regulatory mechanism to require:

Site plan reviews for stormwater/water quality of all new and re-development projects?	☒ Yes	☐ No
Long-term operation and maintenance of stormwater management controls?	☒ Yes	☐ No
Retrofitting to incorporate long-term stormwater management controls?	☒ Yes	☐ No

B. If you have retrofit requirements, what are the circumstances/criteria?

For all SSCAFCA-owned projects, all site plan reviews include stormwater quality evaluations and operations and maintenance evaluations.

C What are your criteria for determining which new/re-development stormwater plans you will review (e.g., all projects, projects disturbing greater than one acre, etc.)?

All SSCAFCA-owned projects are reviewed.

D. Do you require water quality or quantity design standards or performance standards, either directly or by reference to a state or other standard, be met for new development and re-development? ☒ Yes ☐ No

E. Do these performance or design standards require that pre-development hydrology be met for:

Flow volumes	☐ Yes	☒ No
Peak discharge rates	☒ Yes	☐ No
Discharge frequency	☐ Yes	☒ No
Flow duration	☐ Yes	☒ No

F. Please provide the URL/reference where all post-construction stormwater management standards can be found.

Watershed management plans are located at: http://sscafca.org/watershed-and-drain-management-plans/

G. How many development and redevelopment project plans were reviewed during the reporting period to assess impacts to water quality and receiving stream protection? 3

H. How many of the plans identified in 7.G were approved? 3

I. How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period? 0

J. How many of the practices/facilities identified in I were found to have inadequate maintenance? 0

K. How long do you give operators to remedy any operation and maintenance deficiencies identified during inspections? NA

L. Do you have authority to take enforcement action for failure to properly operate and maintain stormwater practices/facilities? ☐ Yes ☒ No

M. How many formal enforcement actions (i.e., more than a verbal or written warning) were taken for failure to adequately operate and/or maintain stormwater management practices? 0

N. Do you use an electronic tool (e.g., GIS, database, spreadsheet) to track post-construction BMPs, inspections and maintenance? ☒ Yes ☐ No

O. Do all municipal departments and/or staff (as relevant) have access to this tracking system? ☒ Yes ☐ No

P. How often do municipal employees receive training on the post-construction program? As needed

8. **Program Resources**

A. What was the annual expenditure to implement MS4 permit requirements this reporting period? $741,859.97

B. What is next year's budget for implementing the requirements of your MS4 NPDES permit? $50,240.00

C. This year what is/are your source(s) of funding for the stormwater program, and annual revenue (amount or percentage) derived from each?

Source:	Property tax mil levy	Amount $		OR %	100
Source:		Amount $		OR %	
Source:		Amount $		OR %	

D. How many FTEs does your municipality devote to the stormwater program (specifically for implementing the stormwater program; not municipal employees with other primary responsibilities)? 1.5

E. Do you share program implementation responsibilities with any other entities? ☒ Yes ☐ No

Entity	Activity/Task/Responsibility	Your Oversight/Accountability Mechanism
See attached	Storm Water Quality Team	Signed agreement
See attached	Compliance Monitoring Cooperative	Signed agreement
See attached	Technical Advisory Group	Signed agreement

9. Evaluating/Measuring Progress

A. What indicators do you use to evaluate the overall effectiveness of your stormwater management program, how long have you been tracking them, and at what frequency? These are not measurable goals for individual management practices or tasks, but large-scale or long-term metrics for the overall program, such as macroinvertebrate community indices, measures of effective impervious cover in the watershed, indicators of in-stream hydrologic stability, etc.

Indicator	Began Tracking (year)	Frequency	Number of Locations
Example: E. coli	2003	Weekly April–September	20
Various (EPA approved analyte list)	2016	Qualifying Events (up to 7)	2
Various (EPA approved analyte list)	2014	Wet season, annually	8
Please refer to attached Annual Report			2
or SSCAFCA website for additional			
information			

B. What environmental quality trends have you documented over the duration of your stormwater program? Reports or summaries can be attached electronically, or provide the URL to where they may be found on the Web.

Given the data collected (1 year, 4 samples) by the Compliance Monitoring Cooperative (CMC), observable trends have yet to be identified. CMC monitoring memos are included as attachments to this Annual Report.

10. Additional Information

Please attach any additional information on the performance of your MS4 program, including information required in Parts I.C, I.D, and III.B. If providing clarification to any of the questions above, please provide the question number (e.g., 2C) in your response.

Certification Statement and Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

☒ Yes ☐ No

Federal regulations require this application to be signed as follows: **For a municipal, State, Federal, or other public facility**: by either a principal executive or ranking elected official.

Signature 

CHARLES THOMAS, P.E. — Name of Certifying Official, Title

11/22/2017 — Date (mm/dd/yyyy)

October 13, 2017

2017 Annual Report Supplement (Reporting period 7/1/16 – 6/30/17)
NPDES Permit NMR04A001
Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)

This document is being provided as a supplement to the form that was provided by the EPA as the format for the Annual Report. The supplement is being used to provide more explanation to responses provided in the Annual Report form where specific circumstances of SSCAFCA's status require more information to be provided than is allowed on the form.

Section 1, NPDES Number: The pdf form provided by the EPA does not allow for non-numeric data entry in this field. The NPDES number for our permit is NMR04A001

Section 4.A, "Do you have an ordinance or other regulatory mechanism stipulating: erosion control requirements; other construction waste control requirements; requirement to submit construction plans for review; and, MS4 enforcement authority?"

Response: On the form, SSCAFCA has indicated "yes" to all of these program elements. It should be noted that SSCAFCA only has jurisdictional authority over SSCAFCA-owned projects. The indication of "yes" on the Annual Report shall be in the context of SSCAFCA-owned projects only.

Section 4.B, "Do you have written procedures for: reviewing construction plans; performing inspections; and, responding to violations?"

Response: On the form, SSCAFCA has indicated "yes" to all of these program elements. It should be noted that SSCAFCA only has jurisdictional authority over SSCAFCA-owned projects. The indication of "yes" on the Annual Report shall be in the context of SSCAFCA-owned projects only.

Section 4.F, "Do you prioritize certain construction sites for more frequent inspections?"

Response: On the form, SSCAFCA has indicated "no" to this program element. Since SSCAFCA only has jurisdiction over SSCAFCA-owned projects, SSCAFCA inspects these projects with the same priority.

Section 4.H, "Do you use an electronic tool (e.g. GIS, data base, spreadsheet) to track locations, inspection results, and enforcement actions of active construction sites in your jurisdiction?"

Response: On the form, SSCAFCA has indicated "no" to this program element. Since SSCAFCA only has jurisdiction over SSCAFCA-owned projects and since there are relatively few of these projects underway at any one time, the usage of an electronic means of tracking was deemed to be not necessary and would provide more burden than assistance with regard to tracking these program items.

Section 4.I, "What are the 3 most common types of violations documented during the reporting period?"

Response: During the reporting period, SSCAFCA had three active SSCAFCA-owned construction projects. This project was inspected by SSCAFCA personnel and contractor personnel frequently and no violations were identified during the project.

October 13, 2017

Section 6.A, "Have stormwater pollution prevention plans (or an equivalent plan) been developed for: All public parks, ball fields, other recreational facilities and other open spaces; all municipal construction activities including those disturbing less than 1 acre; all municipal turf grass/landscape management activities; all municipal vehicle fueling, operation, and maintenance activities; all municipal maintenance yards; and all municipal waste handling and disposal areas?"

Response: On the form, SSCAFCA has indicated "no" to these program elements. SSCAFCA does not currently own or operate any of the types of facilities indicated in the Annual Report form.

Section 6.B, "Are stormwater inspections conducted at these facilities?"

Response: On the form, SSCAFCA has indicated "no" to this program element. Since SSCAFCA does not own or operate any of these facility types, no inspections have occurred.

Section 7.A, "Do you have an ordinance or other regulatory mechanism to require: Site plan reviews for stormwater/water quality of all new and re-development projects; long-term operation and maintenance of stormwater management controls; retrofitting to incorporate long-term stormwater management criteria?"

Response: On the form, SSCAFCA has indicated "yes" on all program elements. SSCAFCA does not have jurisdiction outside of SSCAFCA-owned projects. SSCAFCA does have internal polices directing staff with regard to the program elements. However, SSCAFCA does participate in some plan reviews with the City of Rio Rancho for those developments that may impact SSCAFCA facilities. During this annual report year, SSCAFCA reviewed four development plans meeting these criteria and identified Low Impact Development opportunities one three of these plans.

Section 7.D, "Do you require water quality or quantity design standards or performance standards, either directly or by reference to a state or other standard, be met for new development and re-development?"

Response: On the form, SSCAFCA has indicated "yes" on this program element. On SSCAFCA-owned projects, SSCAFCA is required by State Law, to abide by the 96 hour rule, requiring all flood control facilities to discharge all detained stormwater within 96 hours. Therefore, all SSCAFCA flood control projects drain within 96 hours.

Section 7.E, "Do these performance or design standards require that pre-development hydrology be met for: flow volumes; peak discharge rates; discharge frequency; and, flow duration?"

Response: On the form, SSCAFCA has indicated "no" on all program elements except for Peak Discharge Rates. SSCAFCA-owned projects are flood control projects that generate little to no excess stormwater on site as the vast majority (>99%) of these projects are not constructed from impermeable materials. These projects are constructed to manage up-stream flows from development and attenuate the hydrograph so that stormwater can be conveyed safely through downstream facilities. However, SSCAFCA-owned projects are designed to provide for attenuation of stormwater hydrographs from upstream and discharge at historical levels.

October 13, 2017

Section 7.I, "How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period?"

Response: On the form, SSCAFCA has indicated "0" for this program element. SSCAFCA does not have statutory authority to regulate private development, including regulation of post-development conditions.

Section 7.J, "How many practices/facilities identified in I were found to have inadequate maintenance?"

Response: On the form, SSCAFCA has indicated "0" for this program element. SSCAFCA does not have statutory authority to regulate private development or post-construction conditions in private development. However, SSCAFCA facilities inspected for routine maintenance during the reporting cycle had maintenance needs identified and carried out.

Section 7.L, "Do you have authority to take enforcement action for failure to property operate and maintain stormwater practices/facilities?"

Response: On the form, SSCAFCA has indicated "No" for this program element. SSCAFCA does not have statutory authority to regulate private development or post-construction conditions in private development.

Section 7.N, "Do you use an electronic tool (e.g. GIS, database, spreadsheet) to track post-construction BMPs, inspections, and maintenance?"

Response: On the form, SSCAFCA has indicated "Yes" for this program element. SSCAFCA uses a spreadsheet for reporting maintenance activities to the U.S. Army Corps of Engineers (USACE) as part of the Letter of Permission for maintenance work within the Waters of the United States. SSCAFCA facilities are, for the most part, considered Waters of the United States by the USACE.

Section 8.A, "What was the annual expenditure to implement the MS4 permit requirements this reporting period?"

Response: On the form, SSCAFCA has indicated a value of $741,859.97. This amount includes capital funds that were expended for the Bosque de Bernalillo Water Quality Facility project on the Coronado Arroyo, dues to the Stormwater Quality Team, expenditures for operating the Arroyo Classroom program in Sandoval County through Cuidad Soil and Water Conservation District, and SSCAFCA's contribution to the Compliance Monitoring Cooperative.

Section 8.B, "What is next year's budget for implementing the requirements of your MS4 NPDES permit?"

Response: On the form, SSCAFCA has indicated a value of $50,240.00. This amount does not include salaries for personnel working on permit compliance issues. There are no projected capital outlay projects targeted at stormwater quality during the 2017-2018 reporting year, hence the reduced number.

STORMWATER QUALITY PROJECTS COMPLETED

Project Name: Bosque de Bernalillo Water Quality project

Project Status (6/30/17): Construction Completed

Project Summary: This project is located in Bernalillo, NM along Sheriff's Posse Rd. approximately 0.25 miles south of US 550. This new facility is located on the Coronado Arroyo, which conveys storm water from portions of the City of Rio Rancho and the Town Bernalillo, ultimately discharging to the Rio Grande. The water treatment portion of this site is being constructed approximately 900-ft upstream of the confluence with the Rio Grande.

Designed by SSCAFCA's internal engineering design team, the concept for this project is to divert runoff from smaller, more frequent storms into a meandering water quality (WQ) channel where the flow is passively treated before it returns to the main arroyo. As flow enters the meandering WQ portion of this project, it is provided the opportunity to infiltrate into the surrounding sandy soils and get "cleaned" in a variety of ways:

- The WQ channel will include gabion basket side walls. The gabion baskets are filled with basalt rock, a porous igneous rock, which will promote a "wicking" effect on the passing storm water and allow it to soak into the native soils and provide moisture to the native vegetation.

- The WQ channel will include a natural sandy-soil bottom. The soils in this area are naturally sandy in nature and have excellent infiltration rates. This sand acts as a natural filter for oils and other suspended contaminants commonly found in urban/rural storm water discharges.

- The longitudinal slope of the WQ channel is very flat in comparison to the main arroyo. This flat slope will work to reduce flow velocities and allow the storm water to infiltrate.

- The WQ channel outlet pipe, which conveys flow from the WQ channel back into the main arroyo, is set above the channel grade, creating a ponding effect which further promotes infiltration of storm water.

In addition to the WQ component of this project, we have designed a significant amount of improvements to the main Coronado Arroyo including:

- Providing a more efficient, trapezoidal design of the arroyo to increase flow-carrying capacity and protect adjacent property and citizens from runoff resulting from the 1% Chance Annual Storm (100-yr Storm).

- Stabilizing the channel banks strategically with riprap armoring to reduce project cost and impact to the environment.

- Providing grade control structures to mitigate increased flows from future upstream development and preserve the channel's "equilibrium slope".

- Providing maintenance access for the arroyo (where there was previously none) in order to monitor the condition of this system and conduct annual maintenance as required.

- Designing a weather station and flow gauge to improve SSCAFCA's in-house storm data collection and provide the public with realistic "on-the-ground" information on rainfall events.

Water Quality Component: See project summary.

Watershed: Coronado

Pre-construction photo. Main arroyo channel straight and no treatment within watershed prior to discharge to the Rio Grande

Project Site. Water quality meander to right of main channel, post construction

Flows diverted from south barrel of road crossing to water quality meander for treatment. This barrel has a stormdrain inlet from large commercial development west of project site

Project Name:	Campus Dam Construction
Project Status (6/30/17):	Construction Completed
Project Summary:	This project consists of construction of a flood pool, stabilized entrance to flood pool, spillway with ported riser inlet for water quality purposes, dam embankment, and emergency overflow
Water Quality Component:	This facility is equipped with an inverted ported riser located in line with the primary spillway. This ported riser is designed to prevent floatables from passing from the flood pool through the primary spillway, containing all floatables within the flood pool.
Watershed:	La Barranca

Inverted ported riser at dam outlet

Campus Dam embankment showing ported riser outlet

SEDIMENT QUANTITIES REMOVED FROM STORMWATER FACILITIES

2016 SEDIMENT REMOVAL REPORT - USACE LETTER OF PERMISSION FOR MAINTENANCE ACTIVITIES WITHIN DRAINAGE FACILITIES

	Size of Structure (ac)	Sediment Capacity (CYDS)	Sediment Removed (CYDS)	Area disturbed (acres)	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Vactor Cleaning	Access Control	Slide Gate Servicing	Water Monitoring	WQ Structure Cleaning	Bank Restoration
BLACK WATERSHED																
Sugar Channel						X		X		X						
Sunset Pond	5.2	17,600			X		X		X	X		X				X
Cabezon Channel	1700 lnft	40,800 (3-ft depth)				X		X	X	X		X				
Tract 17 Pond	15.9	20,000			X		X	X	X	X	X	X				X
Roskos Field Pond	0.7	4000			X	X	X	X	X	X	X					
Ivory Channel (Spur Way to Spur Ct.)	578lnft	13872 (3-ft depth)				X		X	X							
Gateway Pond	5.65	800-1200			X		X	X	X	X		X				X
Environmental Mitigation Area	77.88								X	X		X				
MONTOYAS WATERSHED																
Northern Blvd Sedimentation Basin	4.56	23,000			X		X	X		X						
Sportsplex Dam Floodpool	33.48	44,500	3000	6.67	X		X	X	X	X		X				X
Lower Montoyas Water Quality		66,000	8000	1.47	X		X	X	X	X		X				
Harvey Jones Channel	5067lnft	77,450						X		X		X				
Harvey Jones Channel Outlet	8.06				X	X	X	X	X	X		X				
Lomitas Negras Water Quality Facility	28	45,673	3000	0.65	X	X	X	X	X	X		X				X
Dulcelina Curtis Channel	5088lnft	38,100				X		X		X		X				
Corrales Heights Dam 1	35	15,000			X	X	X	X	X	X		X				X
Dam 4 to 1 pipeline	3354lnft					X		X		X	X	X				
Tree Farm Pond A	1.57	800			X		X		X	X		X				X
Tree Farm Pond B	1.01	600			X		X		X	X		X				X
Urban Pond A	0.95	600			X		X		X	X		X				X
Urban Pond B	6.63	1200			X		X		X	X		X				X
Urban Pond C	0.79	600			X		X		X	X		X				X
Northern Meadows Channel(S)																
Los Montoyas	7124lnft					X	X	X	X	X						
Ponce De Leon	5157lnft					X	X	X	X	X						
Northern Meadows ponds					X											X
Wilpett Pond 1	2.37	2500			X		X		X	X		X				X
Wilpett Pond 2	1.5	1200			X		X		X	X		X				X
Wilpett Pond 3	2.52	2700			X		X		X	X		X				X
Wilpett Pond 4	2.22	2500			X		X		X	X		X				X
Wilpett Pond 5	2.51	2500			X		X		X	X		X				X
Wilpett Pond 6	4.98	5000			X		X		X	X		X				X
Clear Creek Pond	1.6	800			X		X		X	X		X				X
Desert Willow Pond	2.36	1600			X		X		X	X		X				X
Flat Iron Pond	3.22	1800			X		X		X	X		X				X

	Size of Structure (ac)	Sediment Capacity (CYDS)	Sediment Removed (CYDS)	Area disturbed (acres)	Sediment Removal on Earthen Structures	Sediment Removal on Concrete Structures	Erosion Repair and Control	Concrete Repairs	Vegetation Removal/ Management	Manual Trash Removal	Vactor Cleaning	Access Control	Slide Gate Servicing	Water Monitoring	WQ Structure Cleaning	Bank Restoration
Havasua Falls Pond	1.18	1500			X		X		X	X		X				X
James Road Pond	1.22	1500			X		X		X	X		X				X
Camino de Los Montoyas Pond	1.18	800			X		X		X	X		X				X
Zia Park Pond	0.77	500			X		X		X	X		X				X
King Road Pond(s)	5	5500			X		X		X	X		X				X
Valley Meadows Pond	0.5	500			X		X		X	X		X				X
Tract H Pond	4.18	2500			X		X		X	X		X				X
Sundt Pond	2.57	2500			X		X		X	X		X				X
Los Rios Lower pond	0.63	400			X		X	X	X	X		X				X
Los Rios Upper Pond	0.62	350			X		X	X	X	X		X				X
Pam's Pond	0.26	1200			X		X		X	X		X				X
Pond 116	1.61	800			X		X	X	X	X		X				X
Cielo Norte Pond and Outfall	1.03	850			X		X	X	X	X		X				X
VENADA WATERSHED																
Lower Venada Channel (NM528 to WQ Feature)	11.1	44,000	3000	3.56	X		X	X	X	X						
Lower Venada Channel (WQ Feature)	2.1								X							
Enchanted Hills Dam 1	8.55	14,000	13000	2.23	X	X	X	X	X	X		X				X
Encantada Channel	12.5	1200				X		X		X	X		X			X
Mariposa Ponds					X		X		X	X		X				X
Pond 1	3.55	1500	1000	0.2												
Pond 2	5.58	1000														
Pond 3	2.14	800														
Pond 4	1.96	800														
Pond 5	2.23	1100														
Pond 6	2.23	1100														
Chayote Pond	4.48	2500			X		X		X	X		X				X
Santa Fe Hills Pond	4.85	2500			X		X		X	X		X				X
Sprint Pond	9.05	4000			X		X		X	X		X				X
Joiner Pipeline and stilling basin	5.74	400				X	X	X	X	X		X				
BARRANCAS WATERSHED																
Guadalajara Pond	1	800			X		X		X	X		X				X

Assessment of findings regarding GI/LID/Sustainable Practices at SSCAFCA

Assessment of findings regarding GI/LID/Sustainable Practices at SSCAFCA
As required in permit Part I.D.5.h.(iv)

The Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) has long been a proponent of GI/LID/Sustainable Practices within the jurisdictional area of the Authority. This is evidenced by the construction techniques used at the SSCAFCA headquarters building in Rio Rancho, New Mexico. Prior to the requirement for GI/LID/Sustainable Practices mandate in the watershed based permit, SSCAFCA installed demonstration GI/LID elements at its headquarters building, integrating them into the site and structural design. These demonstrations have been used as an example of GI/LID

As stated in SSCAFCA's Stormwater Management Plan (December, 2016), SSCAFCA does not have statutory authority to regulate development or develop ordinances governing development within the agency's jurisdictional boundaries. In order to promote GI/LID/Sustainable Practices within the jurisdiction, SSCAFCA must work with the City of Rio Rancho and leverage their authority to enforce ordinances to such ends.

However, this statutory limitation does not impede SSCAFCA from implementing GI/LID/Sustainable Practices related to SSCAFCA facilities and property. The one external impediment for implementation of GI/LID/Sustainable Practices on SSCAFCA –owned projects is State of New Mexico water rights law, which requires SSCAFCA (or any other stormwater management agency or individual) to release all stored or impounded surface water from storm events within 96 hours of capture. New Mexico State Water Law is administered by the New Mexico State Engineer (State Engineer).

As an agency, SSCAFCA has always maintained that keeping the arroyos in the most natural state possible provides a GI/LID benefit to the entire jurisdiction, including urban runoff from rooftops, driveways, parking lots, and roadways. Since the inception of the agency, SSCAFCA intuitively believed that leaving the arroyos natural would promote infiltration of stormwater, thereby depositing urban runoff contaminants in the sandy bottom of the arroyo. However, until recently, the infiltrative effect of arroyos had not been quantified.

In 2015, SSCAFCA's staff hydrologist, Gerhard Schoener, began a study to quantify the infiltrative impact of the arroyos. His findings, as detailed in the article published in the American Society of Civil Engineers Journal (Attached), are that, especially at low flow, water quality storm events, the arroyos are highly effective at infiltrating significant percentages, if not the entire volume, of an annual storm event. SSCAFCA's continuing commitment to keep the arroyo system as natural as possible provides jurisdiction-wide green "infrastructure", accepting and treating flows from urbanized areas that drain to the arroyos.

The State Engineer has interpreted State Water Law to allow stormwater managers to infiltrate stormwater, but continues to require discharge or any surface water within 96 hours of capture and impoundment.

CASE STUDY – MONTOYAS ARROYO

The Montoyas Arroyo watershed is the most highly urbanized watershed within SSCAFCA's jurisdiction. This arroyo receives flows from the urban core of the City of Rio Rancho as well as significant amounts of urbanized area in the upper Montoyas watershed. Depending on where stormwater discharge from urbanized areas enters the Montoyas arroyo, significant lengths of natural arroyo may exist between the

urbanized area and ultimate discharge to the Rio Grande. For water quality, the ideal situation for making this a successful strategy to limiting water quality impacts on the Rio Grande is to work to limit the flow rate of discharge from urbanized area to a level where the arroyo's natural infiltrative process can adsorb or infiltrate the entire volume of stormwater runoff.

In the case of the Montoyas arroyos, there are several facilities (various ponds specific to subdivisions and the Sportsplex Dam) located within this watershed that help attenuate flows from the urbanized area to the arroyo. This attenuation assists infiltration by lowering flow rates to the arroyo (versus free discharge) so that larger quantities can be infiltrated by the arroyo bottom over this prolonged period of time. All of these facilities are required to fully drain within 96 hours of stormwater capture.

In addition to infiltration by the arroyo bottom, SSCAFCA has constructed a stormwater treatment facility at the bottom of the Montoyas Arroyo watershed. This treatment facility was constructed using GI/LID concepts, incorporating vegetation into hardened structures to capture floatables, providing large ponding areas to slow down stormwater and settle sediment, and retain natural arroyo bottom along the length of the facility to continue infiltrating stormwater until ultimately discharged to the concrete lined Harvey Jones Channel. To supplement the GI/LID features incorporated into this facility, SSCAFCA incorporated hardened more traditional engineering methods for treating stormwater for floatables, including two in-line inverted ported risers and a water quality structure with inverted large diameter ports . In combination, this facility provides for excellent flow-through treatment of stormwater flows.

SUMMARY

In summary, SSCAFCA has no internal impediments to implementing GI/LID/Sustainable practices. The only external impediment is New Mexico State Water Law. In order to comply with state water law but still provide for the maximum amount of water quality treatment, SSCAFCA uses a combination of natural arroyo bottom, flow attenuation facilities, and engineered water quality structures to provide treatment for the water quality storm volume.

Quantifying Transmission Losses in a New Mexico Ephemeral Stream: A Losing Proposition

Gerhard Schoener[1]

Abstract: Under natural conditions, stormwater runoff in much of the semiarid Southwest drains through a network of unlined stream channels called arroyos. Dry during most of the year, arroyos are transformed into raging rivers for short periods of time following intense rain events. As stormwater travels downstream, a portion of the flow is lost to the highly permeable arroyo bed. The purpose of this study was to quantify these so-called transmission losses for a 13-km reach of one New Mexico arroyo. Infiltration rates were tested in the field using a double-ring infiltrometer. Test results varied considerably from 3.0 to 19.6 cm/h, with a median rate of 9.4 cm/h. Additionally, three stream-gauging stations were installed along the arroyo; for two storms in 2015, they measured a dramatic decrease in peak discharge (91 and 84%, respectively) and runoff volume (90 and 80%, respectively). Gauge data was used to successfully simulate transmission losses in a hydrologic model of the drainage system; the average loss rate for the arroyo was found to be 3.8 cm/h. On average, infiltrometer results overestimated reach-scale loss rates by 60%. **DOI: 10.1061/(ASCE)HE.1943-5584.0001473.** *© 2016 American Society of Civil Engineers.*

Introduction

Under natural conditions, stormwater runoff in the greater Albuquerque area and much of New Mexico drains through a network of unlined stream channels called arroyos. Dry during most of the year, arroyos are transformed into raging rivers for short periods of time—often only hours—following intense rain events. Channel bottom sediments are typically composed of coarser grain sizes than the surrounding overland areas, because fine particles are transported downstream with the runoff. Infiltration rates in arroyos are therefore typically much higher than in the overbank areas adjacent to the channel. This is important because, as stormwater flows through an arroyo towards the receiving water body, a portion of the flow infiltrates the channel bed. Abstractions from the flood hydrograph due to infiltration are called transmission losses.

Transmission losses have been described for ephemeral streams in arid and semiarid regions worldwide (Pilgrim et al. 1988) using various methods. Belmonte and Beltrán (2001) qualitatively described observations of transmission losses for ephemeral streams in the Valencia region of Spain. Hughes and Sami (1992) estimated transmission losses for two events in a semiarid watershed in South Africa based on moisture measurements of the alluvium. They concluded that during the first event, 75% of the flow infiltrated the channel bed; for the second event, transmission losses were estimated at 22% of the total volume.

Multiple studies quantify transmission losses by calculating the water balance for a reach with at least two stream-gauging stations. Greenbaum et al. (2002) studied a 5.5-km reach of the Nahal Zin in Israel's Negev desert; they found that transmission losses reduced the discharge volume 20% for large flows and up to 85% for small flows. Goodrich et al. (2004) reported losses of 26 and 31% of the annual discharge volume for the years 1999–2000 and 2000–2001, respectively, over a 6-km reach in the Walnut Gulch watershed in Arizona. McMahon et al. (2008) found that, on average, losses equaled 77% of the total flood volume for a reach (approximately 250 km) of the Diamantina River in the Lake Eyre Basin, Australia. Lange (2005) studied a 150-km reach of the Kuiseb River in Namibia and concluded that transmission losses ranged from 29 to 94% of the upstream inflow volume.

In summary, research shows that transmission losses play an important role in the hydrology of arid and semiarid regions, both at large and small scales, and should therefore be included in hydrologic models that simulate rainfall-runoff processes.

Objectives

The aim of this study was to quantify transmission losses along a 13-km reach of the Montoyas Arroyo in Sandoval County, New Mexico. The study approach was to

- Analyze and describe the alluvial sediments along the study reach;
- Conduct in situ infiltration tests at numerous locations along the arroyo, and evaluate whether any correlation exists between soil properties and infiltration test results;
- Measure discharge at three stream-gauging stations and quantify transmission losses by calculating a reach water balance based on hydrographs measured during storm events; and
- Use results from in situ testing and gauging stations to assess whether transmission losses can be successfully incorporated into an existing hydrologic model for the watershed.

Study Area

The Montoyas Arroyo, located in Sandoval County, New Mexico, was selected for this study. The arroyo drains a 150-km^2 watershed and discharges into the Rio Grande just north of Albuquerque. Approximately 20% of the watershed is urbanized. The arroyo remains largely in its natural condition (Fig. 1), except for the last 3 km, where storm flows are conveyed in a concrete channel to alleviate flooding in the lower watershed. On average, the watershed receives approximately 250 mm of rainfall per year, with annual values ranging from 100 to 400 mm (NOAA 2016).

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Fig. 1. (Color) Montoyas Arroyo after a storm; at this location, the arroyo is approximately 40 m wide (image by author)

This study examined the 13-km-long main stem of the arroyo upstream of the concrete channel. The arroyo bottom is composed of alluvial sediments dominated by sand. Arroyo cross sections are characterized by wide, very flat channel beds and often incised vertical banks. Arroyo bottom widths range 25–90 m, with an average width of approximately 45 m (Fig. 1).

Soil and Infiltration Testing

Surface sediments within the Montoyas Arroyo are the result of relatively recent transport and deposition in the active stream channel. To characterize the depth and properties of channel sediments, test borings were drilled to a depth of 15.5 m at four sites along the arroyo using a truck-mounted drilling rig (Fig. 2). Lithologic logs of the test borings were recorded by a field engineer, and samples of subsurface materials were taken at selected intervals. The multicolored columns in Fig. 2 represent the soil types and their respective thickness encountered at each site. Boring results show that surface sediments comprise sands with trace amounts of fines (Fig. 2, yellow) or sand with silt (orange, 5–12% fines). Because of their unconsolidated nature and small amount of fines, these sediments were expected to result in high infiltration rates. The depth of the sandy surface layer ranged from 4 m (Boring Sites 2 and 3) to 13 m (Site 4). At Sites 2–4, the sandy surface layer was underlain by silty sand (red). The higher content of fines (>12%) means that the silty sand horizons are expected to slow infiltration when reached by the wetting front. At Site 1, a layer of silt that would largely impede the vertical movement of water was found at a depth of 7 m. Depth to groundwater along the study reach decreases from approximately 200 m at Site 1 to 30 m at Site 4 (McAda and Barroll 2002).

To quantify surface infiltration rates, infiltration tests were conducted at regular intervals along the arroyo, as indicated by the blue bars in Fig. 2, using a double-ring infiltrometer according to ASTM Standard D3385 (ASTM 2009). The infiltrometer consists of two steel rings that are driven into the ground to a depth of 15 cm. Both rings are filled with water, and the water level is held constant. Water seeping into the ground from the outer ring is intended to constrain lateral movement of water from the inner ring so as to not overestimate infiltration. The volume of water added to the inner ring was recorded in intervals of 3 min. Initial testing indicated that infiltration rates approached a constant value after approximately 15 min. Tests were therefore conducted for a 30-min period at each site, and results for the last 15 min were averaged to estimate the infiltration rate at each test site.

Infiltration test results are displayed as blue bars in Fig. 2. Although arroyo bottom sediments were fairly uniform and consistently low in fines, infiltration rates varied considerably from 3.0 to 19.6 cm/h, with a median infiltration rate of 9.4 cm/h. A box-and-whisker plot of test results can be seen in Fig. 3.

Grab samples of arroyo bottom sediments at 16 infiltration test sites were subjected to particle size analysis in accordance with ASTM Standard D422 (ASTM 2007). Thirteen samples were classified as sands with trace amount of fines (<5%); three were found to be sands with silt (5–12% fines). No strong correlation between particle size characteristics and measured infiltration rates at the corresponding 16 test sites could be established (Fig. 4). The three test sites with the highest content of fines consistently resulted in low infiltration rates. Sites with soils low in fines (less than 5%), however, showed no correlation between measured infiltration and percent fine material. Since most of the arroyo bottom sediments fall into the sand category, the percentage of fines in a soil sample is not a good predictor for expected infiltration rates at any given site. Other soil parameters based on the particle size analysis (D_{10}, D_{50}, C_u, C_c) showed no correlation with measured infiltration rates.

During some of the infiltration tests, a blue food-grade dye was added to the water in the inner ring. After completion of the 30-min test, the steel rings were removed and a trench was excavated

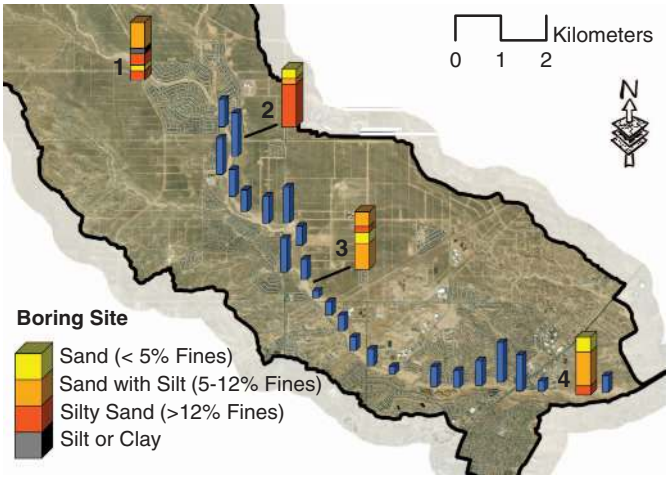

Fig. 2. (Color) Lower Montoyas watershed showing boring locations and soil columns as well as infiltration test locations and results (blue bars)

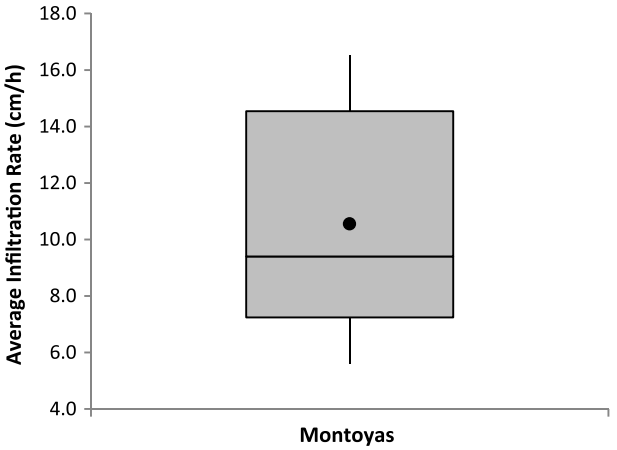

Fig. 3. Box-and-whisker plot summarizing infiltration test results from 22 test sites along the Montoyas Arroyo

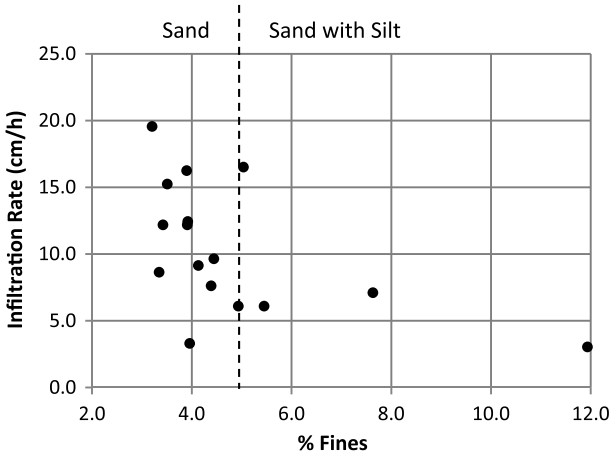

Fig. 4. Scatter plot comparing measured infiltration rates and % fines from soil samples at 16 sites in the Montoyas Arroyo

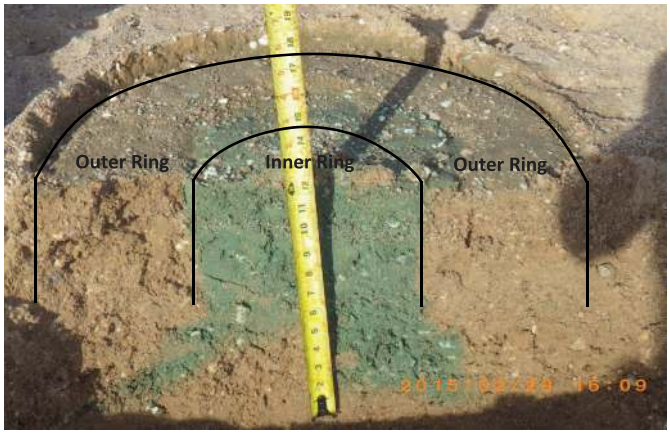

Fig. 5. (Color) Dye added to the inner ring of a double-ring infiltrometer showing the extent and direction of flow after removal of steel rings (tape measure scale: in inches; 1 in. = 2.54 cm) (image by author)

through the center of the test area (Fig. 5). The depth to which the inner and outer rings penetrated the ground is indicated by black lines in Fig. 5. The dye-stained portion of the soil profile reveals that once the wetting front reached the lower end of the inner ring, water started moving laterally. The double-ring infiltrometer test therefore likely overestimates actual infiltration rates in the arroyo during flow conditions.

Lai and Ren (2007) studied the effect of inner-ring dimension on the variability in double-ring infiltrometer test results in heterogeneous soil. They found that variability in measured infiltration rates was greatest for smaller inner rings, particularly rings with a diameter of less than 30 cm. Swartzendruber and Olson (1961) found that for inner rings with a diameter of 40 cm or less, measurements were as much as double the actual infiltration rate. The diameter of the inner ring used in this study was 30 cm.

The high variability in test results and the lack of correlation with particle size characteristics indicates that the test is very sensitive to small, local variations in soil composition, layering, and/or density, in addition to variability and bias associated with the test methodology itself (Lai and Ren 2007; Swartzendruber and Olson 1961). Test results provide some insight into variability of infiltration rates across the study area, but are probably not suitable for characterizing infiltration on a reach scale.

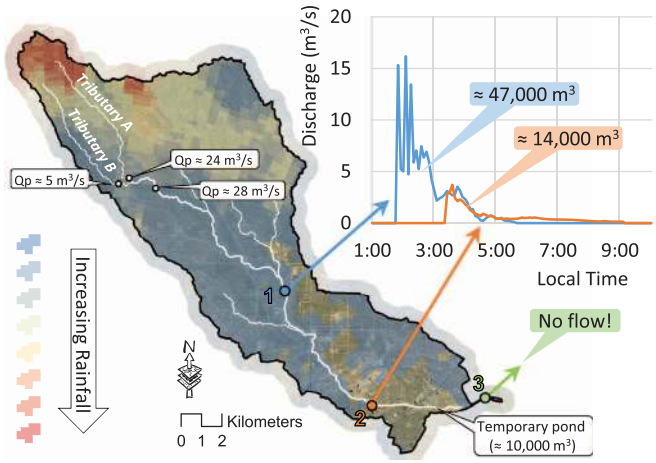

Fig. 6. (Color) Montoyas watershed showing extent of the June 16, 2015, storm (shaded background) and decreasing storm flows in the arroyo as stormwater moves downstream

Stream Gauging

In addition to soil and infiltration testing, three stream-gauging stations were installed along the Montoyas Arroyo (for station locations refer to Fig. 6). The concept being tested was that transmission losses should be reflected in decreasing runoff volume shown in the hydrograph at each gauging station (a hydrograph is a plot of discharge over time) as stormwater travels downstream. For the experiment to work, several conditions had to be met:

- A storm of sufficient intensity and duration to result in runoff;
- A storm occurring high in the watershed and upstream of the uppermost gauging station so that no significant runoff would enter the arroyo between gauging stations (no lateral inflow); and
- Peak discharge small enough so that transmission losses were a significant portion of total flow.

Each gauging station was located at a hardened structure in the arroyo to avoid changes to the channel cross section due to erosion. Measurement of discharge in the field during a flow event is typically not possible because flow durations are short and storms often occur at night. Even in cases where storm flows can be observed directly, high velocities and debris in the floodwaters make field measurements difficult and dangerous. At each station, flow depth was therefore recorded automatically at 5-min intervals using a pressure transducer (In-Situ Level TROLL 500, Fort Collins, Colorado). Discharge was estimated by means of a theoretical rating curve developed in *HEC-RAS* (USACE 2010) for each station. Two storms that met the criteria listed previously occurred in 2015 and are described in detail next.

Storm of June 16, 2015

On June 16, 2015, an intense thunderstorm impacted the upper reach of the Montoyas watershed. Rainfall estimates derived from radar data indicated total precipitation depths of 3–5 cm in little more than 1 h at the center of the storm (orange to red shading, Fig. 6).

Storm flows had to travel through more than 10 km of arroyo before reaching Gauging Station 1. Because peak discharges in the arroyo closer to the center of the storm were of interest, three locations with relatively uniform reach geometry were selected in the upper watershed (Fig. 6, white circles). Debris transported with storm flows (pine needles, branches, etc.) left distinct high-water

marks along channel banks and vegetation. At each location, high-water marks and channel geometry (cross sections and slope) were surveyed using a TOPCON AT-G series auto level (TOPCON, Livermore, California). A theoretical rating curve for each reach was developed in *HEC-RAS*, and peak discharges were estimated based on high-water marks. The analysis yielded estimated peak discharge rates of 5 and 24 m^3/s in Tributaries B and A, respectively, and approximately 28 m^3/s below the confluence of the two tributaries (Fig. 6).

Fig. 6 illustrates how the runoff hydrograph decreased because of transmission losses as it moved downstream through the arroyo. Peak discharge decreased from an estimated 28 m^3/s just below the tributary confluence to 16 m^3/s at Gauging Station 1 (blue circle, Fig. 6). At Station 2 (orange circle, Fig. 6) peak flow was less than 4 m^3/s. A temporary pond built in the arroyo just upstream of Station 3 as part of a project under construction at the time of the storm event captured the remainder of the hydrograph, and no flow reached the outlet of the watershed. Runoff volume decreased from approximately 47,000 m^3 at Station 1 to 14,000 m^3 at Station 2. A field survey following the storm event revealed that approximately 10,000 m^3 of runoff was captured in the temporary pond. No lateral inflow entered the arroyo between Stations 1 and 3. Model results (discussed later) indicate that without the temporary pond, peak discharge at Station 3 would have been 1.5 m^3/s—a 91% decrease compared with Station 1. Runoff volume at Station 3 would have decreased by 90%, to 4,600 m^3 compared with Station 1.

Storm of July 7, 2015

The storm of July 7, 2015, impacted the majority of the upper Montoyas watershed. Radar data indicate that at the most intense locations of the storm between 1 and 3 cm of rain fell in approximately 30 min. The storm resulted in a measured peak discharge of approximately 16 m^3/s at Gauging Station 1 (Fig. 7, blue circle), with a total runoff volume of approximately 59,000 m^3.

It is noteworthy that peak discharge at Station 1 was identical to the June 16 storm, even though storm intensity and total rainfall depth for the July 7 storm was lower. This apparent discrepancy can be explained by the fact that the June 16 storm occurred much higher in the watershed and peak flows estimated at 28 m^3/s (see previous) were reduced by transmission losses as they traveled through more than 10 km of arroyo to Station 1.

Fig. 7 illustrates the effect of transmission losses on the flood hydrograph below Gauging Station 1. At Station 2 (orange circle), peak discharge was reduced to approximately 6 m^3/s, and at Station 3 (green circle) to only 3 m^3/s (84% reduction from Station 1). The total runoff volume also decreased in the downstream direction from approximately 59,000 m^3 at Station 1 (blue) to 25,000 m^3 at Station 2 (orange), and finally 17,000 m^3 at the outlet of the watershed (Station 3, green).

Most of the runoff from the July 7 storm originated upstream of Gauging Station 1. However, some lateral inflow caused by precipitation lower in the watershed entered the arroyo between Stations 1 and 2. Lateral inflow was simulated in *HEC-HMS* based on rainfall measurements from 10 tipping bucket–recording rain gauges (SSCAFCA, unpublished data). Lateral inflow was subsequently removed from the measured-flow hydrograph at Station 2 (Fig. 8). The total volume of lateral inflow between Stations 1 and 2 was estimated at 6,000 m^3, with a peak discharge of 1.5 m^3/s. Lateral inflow (Fig. 8, gray area) did not coincide with the main portion of the hydrograph for Station 1 (Fig. 8, dotted area). Not accounting for lateral inflow, runoff volume between Stations 1 and 3 decreased by approximately 80%.

Modeling Transmission Losses in *HEC-HMS*

Several methodologies for modeling transmission losses can be found in the published literature. Some methods do not route the flood hydrograph along the channel, but focus on predicting outflow volume (Geith and Sultan 2002; Wheater 2007; Greenbaum et al. 2002) and peak discharge (Lane et al. 2007). Rew and McCuen (2010) developed a model that accounts for transmission losses using Horton's infiltration methodology while routing a hydrograph downstream. Another model capable of flood wave routing, published by Costa et al. (2012), uses a modified form of the Green-Ampt method to estimate transmission losses. Batlle-Aguilar and Cook (2012) used results from a reach-scale infiltration experiment to calibrate a two-dimensional (2D) infiltration model built in *Hydrus 2D* (Šimůnek et al. 2008).

Transmission losses are rarely the main focus of analysis in the southwestern United States, with some exceptions, such as research based on the Walnut Gulch experimental watershed in Arizona (Goodrich et al. 2004). Many hydrologic design manuals published by regulatory agencies in Colorado, Nevada, and New Mexico do

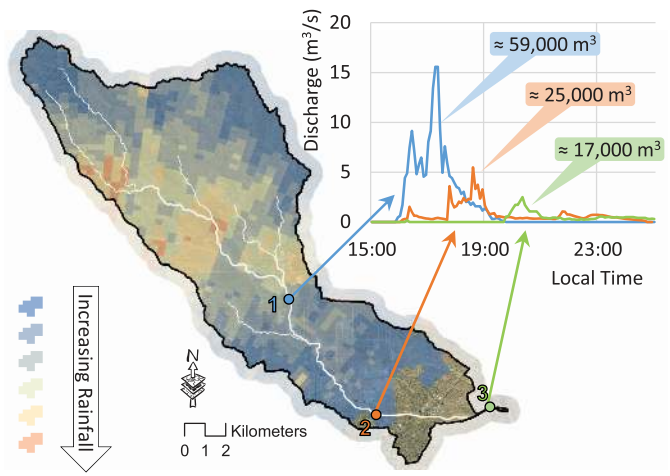

Fig. 7. (Color) Montoyas watershed showing extent of the July 7, 2015, storm (shaded background) and decreasing flows in the arroyo as stormwater moves downstream

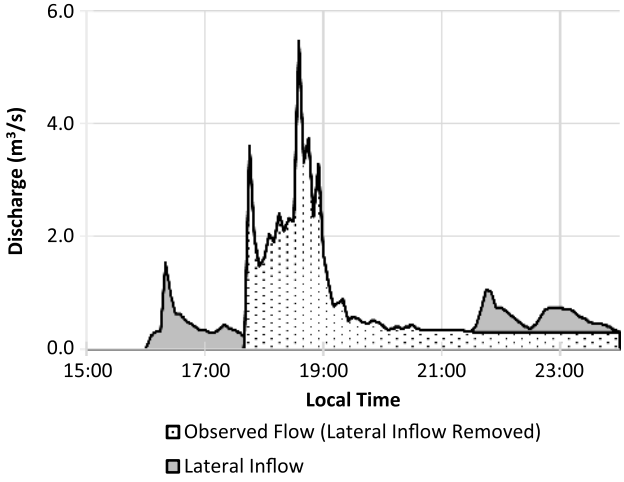

Fig. 8. Measured hydrograph at Gauging Station 2 for the storm of July 7, 2015; the portion of the hydrograph caused by lateral inflow is indicated in gray

not mention transmission losses (UDFCD 2016; CoRR 2009; CABQ 2008; CCRFCD 1999). Transmission losses are mentioned under limitations of the recommended hydrology procedures in the drainage design manual for Maricopa County, Arizona (FCDMC 2013). The design manual for Yavapai County, Arizona (YCFCD 2015), has a section on transmission losses, and, where applicable, recommends use of the percolation method available in *HEC-HMS*.

This study has shown that transmission losses have a significant impact on flood peaks and runoff volumes, and should therefore be included in hydrologic models, even if the main focus of the model is flood control or infrastructure design. Methodologies for simulating transmission losses are available in various hydrologic modeling programs, and some examples are listed subsequently. *HEC-1* (USACE 1998) and *HEC-HMS* (USACE 2015) can account for channel infiltration using a unit loss rate. *MIKE 11*, coupled with the groundwater model *MIKE SHE*, can simulate transmission losses by assigning a riverbed leakage coefficient (Thompson et al. 2004). *FLO-2D* estimates transmission losses from the floodplain using the Green-Ampt method. The soil and water assessment tool (SWAT) simulates transmission losses from ephemeral channels using the effective hydraulic conductivity of the alluvium (Neitsch et al. 2011).

HEC-HMS was selected for this case study because it is the recommended software for hydrologic analyses in the study area (NMOSE 2008; CoRR 2009) and because a comprehensive HEC-HMS model for the watershed draining to the study reach already existed (SSCAFCA, unpublished data).

The existing model of the Montoyas watershed (*HEC-HMS* 4.0) was modified to account for transmission losses in the 13-km reach between Gauging Stations 1 and 3. The arroyo was divided into 25 subreaches, each approximately 0.5 km in length. The average width of each reach was determined by mapping the arroyo bottom area based on aerial photography, and dividing the total area of each reach by its length. Reach slopes were estimated from a digital elevation model for the watershed, and Manning's roughness coefficients were determined by field investigation. Reaches were modeled with rectangular cross sections; this simplifying assumption can be justified because the arroyo bottom is generally very flat and field observations by the author confirm that even during small flows (discharges less than 0.5 m^3/s), the entire channel bottom is inundated. The percolation loss methodology available in *HEC-HMS* was used to model transmission losses for the two storms observed in 2015. A constant infiltration rate was assigned to each of the 25 routing reaches. At each reach, the model multiplied infiltration rate and inundated area to estimate transmission losses for each time step (USACE 2015, p. 192). The inundated area is computed based on reach geometry and flow depth for each time step. Losses are then subtracted from the flood hydrograph. The hydrographs measured at Gauging Station 1 during the June 16 and July 7 storms were routed through the model, and the results were compared to the measured data. Three transmission loss scenarios were evaluated (results are shown in Figs. 9–13):

1. No transmission losses: the hydrograph measured at Station 1 was simply routed through the arroyo without accounting for infiltration into the channel bed;
2. Transmission loss = 3.8 cm/h for each reach: all reaches were assigned a uniform loss rate of 3.8 cm/h; this loss rate was found iteratively by comparing observed and modeled peak discharges and runoff volumes at gauging Stations 2 and 3; and
3. Transmission loss = 35% of measured infiltration: measured infiltration rates for each reach based on the corresponding double-ring infiltrometer test were adjusted iteratively until model peak discharges and runoff volumes most closely matched observed data; the closest match was achieved using 35% of the measured rate for each reach (reach specific infiltration rates ranged 0.4–6.8 cm/h, with an average rate of 3.4 cm/h).

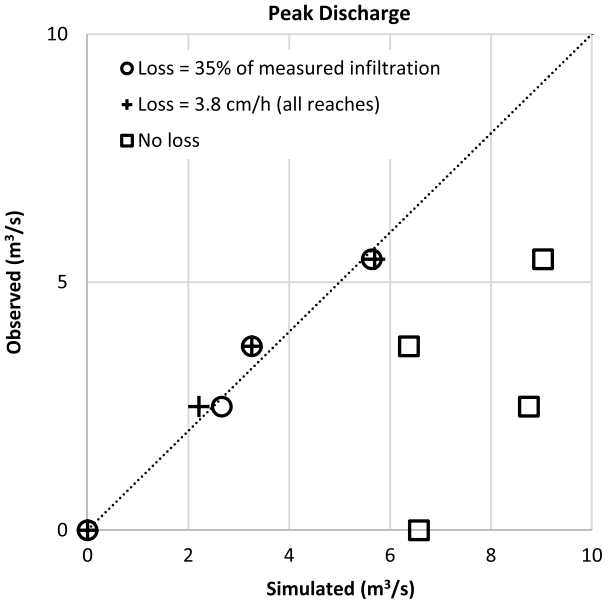

Fig. 9. Comparison of simulated and measured peak discharges based on three transmission loss scenarios

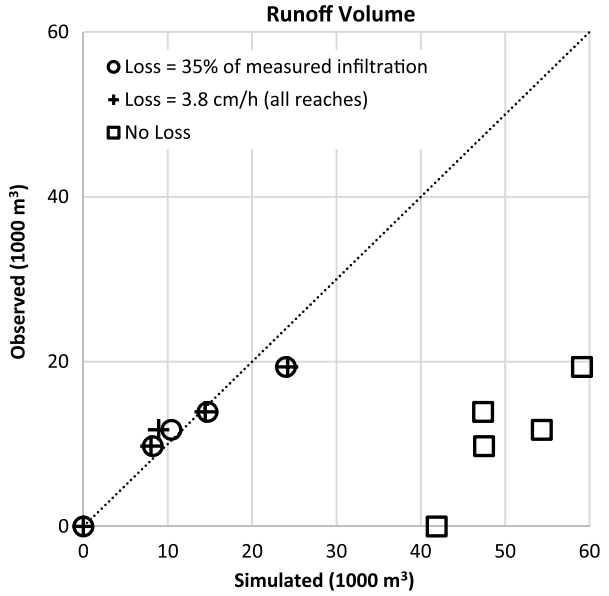

Fig. 10. Comparison of simulated and measured runoff volumes based on three transmission loss scenarios

Fig. 9 compares simulated and observed peak discharges at Stations 2 and 3 for the storms of June 16 and July 7. Data points to the right of the line of agreement (dotted line) indicate that the model overpredicted the measured data. Points that fall on the line indicate agreement between the model and the measured flows. Not surprisingly, model peak flows were higher than the observed data when transmission losses were ignored (Fig. 9, squares). Using 35% of measured infiltration rates (circles), and using a uniform loss rate of 3.8 cm/h for each reach (crosses), both yielded model results that were close to the measured data (points fall close to the line of agreement).

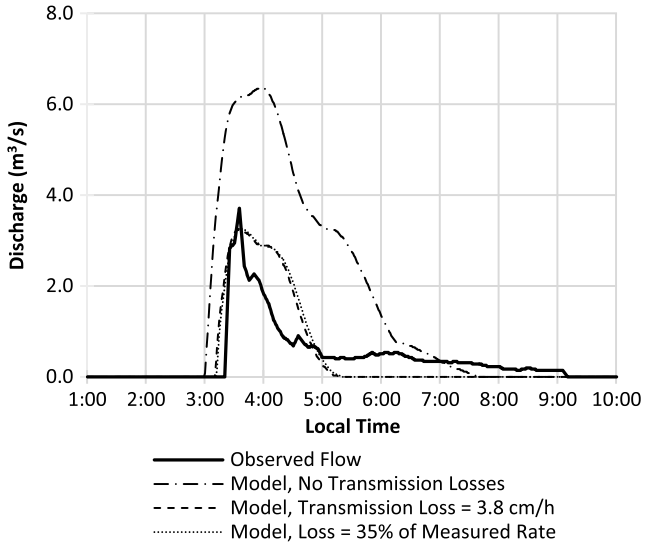

Fig. 11. Comparison of measured (solid) and simulated (dotted, dashed, dash-dotted) hydrographs at Gauging Station 2 for June 16, 2015, storm

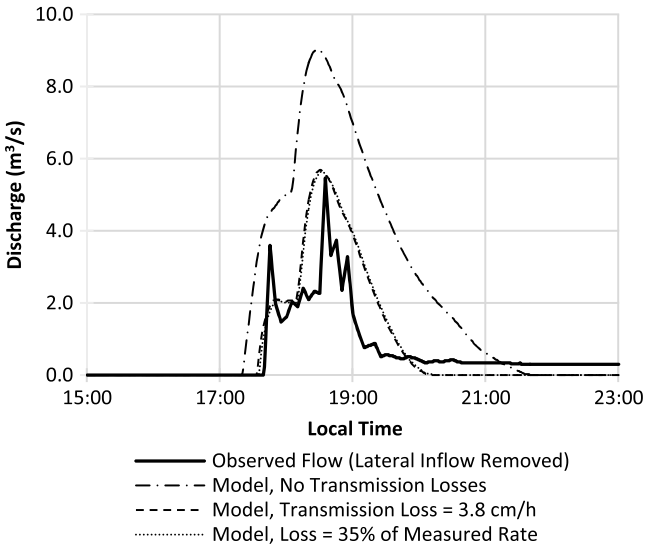

Fig. 12. Comparison of measured (solid) and simulated (dotted, dashed, dash-dotted) hydrographs at Gauging Station 2 for July 7, 2015, storm

Fig. 10 compares simulated and observed runoff volumes at Stations 2 and 3 for both storms, as well as volumes at the temporary pond for the June 16 storm. Again, model results overestimated runoff volumes when transmission losses were ignored (Fig. 10, squares). Using 35% of the measured infiltration rates (circles) and using a uniform loss rate of 3.8 cm/h for each reach (crosses), both resulted in simulated volumes that closely matched the measured data.

Fig. 11 shows the measured hydrograph (solid line) at gauging Station 2 for the June 16 storm compared with the model hydrograph with no transmission losses (dash-dotted line), with uniform transmission losses of 3.8 cm/h for all reaches (dashed line), and with losses equal to 35% of the measured rate for each reach (dotted line). The comparison shows that both loss scenarios were almost identical.

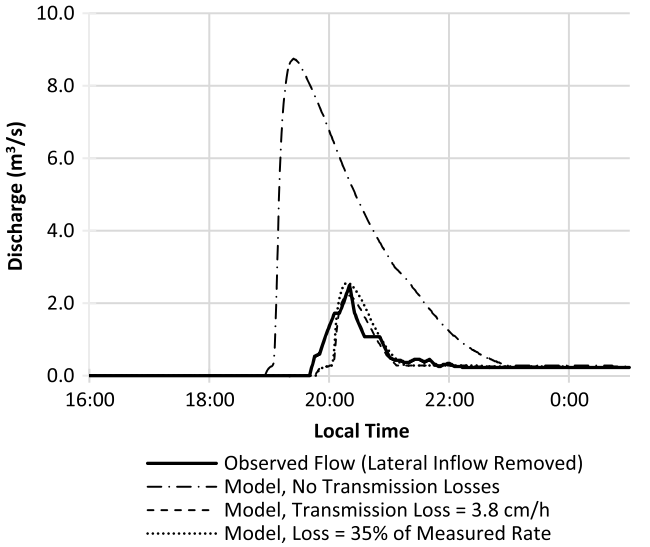

Fig. 13. Comparison of measured (solid) and simulated (dotted, dashed) hydrographs at Gauging Station 3 for July 7, 2015, storm

The receding limb of the modeled hydrograph differs from the observed hydrograph in that the observed flow recedes faster initially but tapers off more gradually after reaching a flow rate of approximately 0.5 m^3/s. This discrepancy is due to the location of Gauging Station 2 at the outlet structure of a flood control dam. In *HEC-HMS*, flow through the dam is modeled using a simple storage-discharge relationship. This can causes problems during small flow events due to routing effects in the flood pool. When inflow into the dam is small (approximately 0.5 m^3/s or less), a low-flow channel conveys all discharge directly to the outlet structure and no attenuation occurs. If the capacity of the low-flow channel is exceeded, stormwater spreads out over the 3-ha flood pool. At the receding end of the hydrograph, water slowly drains from the flood pool, which is essentially flat, toward the outlet. This phenomenon cannot be simulated with one storage-discharge curve because the same discharge value can be associated with different storage values in the rising and receding limb of the hydrograph. For this study, the model was calibrated based primarily on peak discharge, runoff volume, and timing of the peak at Station 2. Discrepancies in the receding limb of the hydrograph were accepted as limitations of the hydrologic model.

Fig. 12 shows the measured hydrograph (solid line, lateral inflow removed) at Gauging Station 2 for the July 7 storm compared to the model hydrograph with no transmission losses (dash-dotted line), with uniform transmission losses of 3.8 cm/h for all reaches (dashed line), and losses equal to 35% of the measured rate for each reach (dotted line).

Fig. 13 shows the same comparison at gauging Station 3. The example illustrates that the difference between the modeled and the observed flows becomes larger going downstream when transmission losses are ignored. Both scenarios of accounting for transmission losses adequately replicated measured hydrographs, with the exception of the receding limb of the hydrograph at Station 2.

Conclusions

This study shows that transmission losses can have a significant impact on flood hydrographs by reducing peak discharges and runoff volumes. Borings and soil testing in the Montoyas Arroyo revealed that channel bottom sediments are composed of sands with

small amounts of fines. Sandy layers are underlain by sediments with more fines and lower infiltration rates. However, because of the depth of the sand layer and relatively short duration of many storms, infiltration rates are expected to remain high for the duration of most runoff events.

Quantifying channel bottom infiltration rates using a double-ring infiltrometer proved to be challenging. Although arroyo bottom soils were found to be fairly uniform, measured infiltration rates varied considerably between test sites and no correlation between particle size characteristics and measured infiltration rate could be established. Variations in test results are likely due to problems with the test method itself (Lai and Ren 2007; Swartzendruber and Olson 1961), the selection of test sites, and local variations in soil characteristics such as soil density and layering. On average, infiltrometer results overestimated reach-scale loss rates by 60%.

Measuring flood hydrographs at various locations along the arroyo proved to be the best method for determining actual transmission losses. Results from two storms observed during June and July of 2015 clearly show that flood hydrographs decreased in size as they traveled downstream. During the June 16 storm, storm flows did not even reach the outlet of the watershed. This study also demonstrates that transmission losses can be modeled successfully with the simplified method available in *HEC-HMS*. The loss methodology assumes a constant infiltration rate into the channel bed; over longer periods of time (days or weeks), this assumption may be violated because of sediment layers with a reduced hydraulic conductivity or if the channel sediments became fully saturated. The latter is unlikely in the case of the Montoyas Arroyo because the regional water table is at a significant depth below the channel surface and impermeable sediments that would allow formation of a shallow, perched aquifer were only encountered at one site outside of the study reach. Typical runoff events in New Mexico only last hours, so assuming a constant loss rate seems justified.

Modeled hydrographs closely matched observed flows with respect to peak discharge, runoff volume, timing, and overall hydrograph shape. Assigning reach-specific loss rates based on a percentage of infiltration rates measured with a double-ring infiltrometer did not improve the model results. Applying a uniform loss rate of 3.8 cm/h for all reaches resulted in the best agreement between observed and modeled flows.

Transmission losses not only impact flood hydrographs; they also have a beneficial impact on water quality, especially in urbanized areas, where pollutants associated with hard-surface runoff are of concern. Natural, unlined arroyos act as natural infiltration galleries, reducing the volume of runoff and thereby the pollutant loads to the receiving water body.

Moreover, transmission losses are thought to be an important source of groundwater recharge in arid environments (Shanafield and Cook 2014; Goodrich et al. 2004; Greenbaum et al. 2002; Geith and Sultan 2002). Many communities in western states rely on groundwater as their sole source of potable water. Increasing urbanization is putting more strain on an already limited resource. Urbanization, however, also increases the frequency and magnitude of runoff events because of an increase in impervious surfaces. If arroyos prove to be important recharge zones for aquifers, quantifying transmission losses can have far-reaching consequences for water management in the future.

Acknowledgments

The author thanks Charles Thomas (SSCAFCA) for his technical review and guidance, as well as Catherine Conran (SSCAFCA) for her review and comments. The author also thanks Terracon Consultants, Inc., and Daniel B. Stephens and Associates, Inc., for geotechnical services, as well as Adrienne Martinez for her help with infiltration testing.

Notation

The following symbols are used in this paper:

C_u = coefficient of uniformity;
C_c = coefficient of curvature;
cm/h = centimeters per hour (infiltration rate);
D_{10} = grain diameter (in millimeters) for which 10% of the sample (by weight) is finer;
D_{50} = median grain size, grain diameter for which half the sample (by weight) is smaller and half is larger;
m^3/s = cubic meters per second (flow rate); and
m^3 = cubic meters (runoff volume).

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COOPERATIVE AGREEMENTS

Middle Rio Grande Stormwater MS4 Technical Advisory Group

MEMORANDUM OF AGREEMENT

A COOPERATIVE AGREEMENT, CREATING THE MIDDLE RIO GRANDE MS4 TECHNICAL ADVISORY GROUP, IN SUPPORT OF COMPLIANCE EFFORTS FOR A STORMWATER DISCHARGE PERMITTING SYSTEM FOR THE MIDDLE RIO GRANDE VALLEY IN ACCORDANCE WITH THE FEDERAL CLEAN WATER ACT.

WHEREAS, the United States Environmental Protection Agency (EPA), Region 6 regulates the discharge of stormwater from municipal separate storm sewer systems (MS4s) in New Mexico through the issuance of an MS4 permit for the Middle Rio Grande valley urbanized area under the authority of the National Pollutant Discharge Elimination System (NPDES) regulations (40CFR122); and

WHEREAS, the Middle Rio Grande area is comprised of many diverse local, state, federal and tribal entities, each with separate and distinct authority and responsibilities; and

WHEREAS, the Middle Rio Grande area entities potentially eligible for authorization under the proposed NPDES General Permit No. NMR04A000 (hereinafter "MS4 Permit"), and therefore are eligible to enter into this Memorandum of Agreement (hereinafter "Agreement") in furtherance of the requirements of the MS4 Permit, are the City of Albuquerque, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), University of New Mexico, New Mexico Department of Transportation District 3, Bernalillo County, Sandoval County, Village of Corrales, City of Rio Rancho, Los Ranchos de Albuquerque, Kirtland Air Force Base, Town of Bernalillo, State Fairgrounds/Expo New Mexico, the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA), the Eastern Sandoval County Arroyo Flood Control Authority (ESCAFCA), Sandia National Laboratories/Department of Energy, Pueblo of Sandia, Pueblo of Isleta, and Pueblo of Santa Ana (collectively "Stormwater Management Entities"); and

WHEREAS, the proposed MS4 Permit encourages cooperative efforts among separate local, state, federal and Tribal governments to reduce the amount of pollutants discharged with stormwater from the Middle Rio Grande urbanized area MS4s; and

WHEREAS, continued cooperation among the Stormwater Management Entities in the MS4 Permit offers an enhanced opportunity for each entity to remain aware of the requirements in the MS4 Permit and facilitate compliance with conditions of the permit;

NOW, THEREFORE, BE IT AGREED THAT:

1. The signatories to this Agreement (hereinafter collectively referred to as "Parties" and individually referred to as "Party") support and encourage a cooperative commitment to assist one another with technical issues regarding compliance with the MS4 Permit and agree to form the Middle Rio Grande MS4 Technical Advisory Group (MS4TAG).

2. The purpose of the MS4TAG will be to exchange technical information regarding compliance with the MS4 Permit, exchange ideas among Parties regarding compliance efforts, and exchange information regarding illicit discharges detected within each Party's jurisdiction. The MS4TAG shall have no binding financial authority and shall be strictly advisory in nature.

3. Nothing in this Agreement shall be construed as obligating a Party to this agreement to expend funds for any purpose, and no Party shall be required to contribute any funds in order to participate in this Agreement. In the event the Parties determine that any joint expenditure of funds among multiple Parties becomes necessary in order to comply with the requirements of the MS4 Permit, a separate agreement shall be entered into between the affected Parties regarding any and all such expenditures at that time.

4. The term of this Agreement shall run from the date the MS4 Permit is issued by the EPA until the date the MS4 Permit is terminated or expires, whichever occurs first. This Agreement may be terminated in its entirety at any time upon the mutual agreement of all of the then-existing Parties to this Agreement. In the event any Party wishes to withdraw from this Agreement without terminating the other Parties' interests in this Agreement, withdrawal shall become effective upon ninety (90) days prior written notice to the other Parties. Withdrawal shall fully and completely terminate that Party's interest in and obligations under this Agreement. Following any Party's withdrawal, this Agreement shall continue in full force and effect as to all remaining Parties to the extent possible.

5. This Agreement does not address the "Public Education and Outreach" or "Cooperative Sampling" sections of the MS4 Permit. Any MS4TAG efforts regarding either of these sections of the MS4 Permit under this Agreement shall be strictly in furtherance of the spirit of cooperation intended among the Parties. Each Party acknowledges its obligations under the "Public Education and Outreach" and "Cooperative Sampling" sections of the MS4 Permit are separate and apart from its activities under this Agreement, and a separate agreement will be required for any collaboration among the Parties with respect to those permit requirements.

6. The Parties will appoint two (2) Co-Coordinators from among the Parties, one of which must be from a Party located within the Bernalillo County geographical area and one of which must be from a Party located within the Sandoval County geographical area. Appointment of a Co-Coordinator shall be by majority vote of the voting Parties, with only those Parties located in the county of Bernalillo voting on the Co-Coordinator from that area, and only those Parties located in the county of Sandoval voting on the Co-Coordinator from that area. Co-Coordinators must be appointed annually in each subsequent permit year, or earlier if the position becomes vacant for any reason. For the New Mexico Department of Transportation District 3, which operates stormwater management facilities in both counties, for the purposes of this section, they shall select one county affiliation in year one of the agreement and alternate affiliations is subsequent years of this Agreement. The Co-Coordinators will be expected to coordinate the Parties' efforts under this Agreement, including facilitating meetings of the MS4TAG at least monthly for the first year of the MS4 Permit. In years two through five of the permit, the frequency of meetings may be reduced to quarterly with additional meetings called as necessary to discuss issues regarding MS4 Permit compliance.

7. Each Party shall be entitled to one (1) vote on any action items.

8. This Agreement creates no obligations on behalf of any Party to any other Party to this Agreement, including for any requirements imposed or determinations made by EPA. The Parties acknowledge and agree that each shall at all times remain individually liable for full compliance with the requirements of the MS4 Permit, including EPA's determination regarding the implementation schedule.

9. This Agreement may be modified in writing at any time upon the mutual agreement of the Parties.

10. Parties can be added at any time during the life of this Agreement. A potential future Party's submittal of a signature page to the Co-Coordinators and approval by the Co-Coordinators shall add the Party to the Agreement.

Approved as to Form:

Bernard P. Metzgar
SSCAFCA Attorney

Date: 10/04/13

Southern Sandoval County Arroyo
Flood Control Authority

Date: 10/18/13

Donald Rudy, Chairman

City of Rio Rancho

Approved as to Form:

City Attorney

Date: 10/4/13

Recommended By:

Dolores Wood, Director

Date: 11.4.13

Approved By:

Keith Riesberg, City Manager

Date: 11/1/13

Approved as to Form:

George Perez
Town of Bernalillo Attorney

Date: 10/15/2013

Mayor Jack Torres, Town of Bernalillo

Date: 10/14/13

Attest: _____ Date: 10/14/13
Ida Fierro, Town Clerk

VILLAGE OF CORRALES

By: _____ 10·08·13
Philip Gasteyer, Mayor Date

Attest:

_____ 10-08-2013
Juan Reyes, Village Clerk Date

IN WITNESS WHEREOF, the undersigned have caused this Agreement to be executed.

Albuquerque Metropolitan Arroyo Flood Control Authority

Date: 10/24/2013

Tim Eichenberg
Chair of the Board of Directors

Attest:

Bruce Thomson
Secretary/Treasurer

Date: 10/24/13

VILLAGE OF LOS RANCHOS DE ALBUQUERQUE

Date: November 14, 2013

LARRY P. ABRAHAM
MAYOR

(SEAL)

STEHANIE DOMINGUEZ
VILLAGE CLERK

Accepted on behalf of:

U.S. DEPARTMENT OF ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION
SANDIA FIELD OFFICE

By: _____ 14 NOV 2013

Geoffrey L. Beausoleil
Manager

Date

MIDDLE RIO GRANDE STORMWATER
MS4 TECHNICAL ADVISORY GROUP
FINAL

Approved as to Form:

Bernard P. Metzgar
ESCAFCA Attorney

Date: 11/14/13

Eastern Sandoval County Arroyo Flood Control Authority

Date: NOV. 19, 2013

Salvador Reyes, Chairman

UNIVERSITY OF NEW MEXICO

Approved by:

David W. Harris Date: 12/12/13

David Harris, Executive Vice President

Recommended by:

Carla P. Domenici Date: 12-10-13

Carla P. Domenici, Director
Safety and Risk Services Department

New Mexico Department of Transportation

Approved By:

Tim Parker

Date: 12/22/13

Timothy L. Parker, M.S., P.E.
NMDOT District Three Engineer

Approved As To Form Only:

Date: 12/18/2013

Ken Swain, Assistant General Counsel
Office of the General Counsel

BC CCN 2014-0069

BERNALILLO COUNTY

Motion to: Approve a Memorandum of Agreement (MOA) joining the County with other local entities participating in the Middle Rio Grande MS4 Technical Advisory Group (MS4TAG).

Approved this 28th day of January, 2014

BOARD OF COUNTY COMMISSIONERS

Debbie O'Malley, Chair

Art De La Cruz, Vice Chair

Maggie Hart Stebbins, Member

Lonnie C. Talbert, Member

Wayne A. Johnson, Member

APPROVED AS TO FORM:

County Attorney

Date: 1/28/14

ATTEST:

Maggie Toulouse Oliver, County Clerk

Date: 1/28/14

BERNALILLO COUNTY COUNTY CLERK SEAL STATE OF NEW MEXICO

Approved as to Form:

Patrick F.Trujillo
Sandoval County Attorney

Date: 1/27/2014

Sandoval County

Date: 2/6/2014

Phillip Rios, County Manager

MIDDLE RIO GRANDE STORMWATER
MS4 TECHNICAL ADVISORY GROUP
FINAL

10-07-13

Approved as to Form:

David Tourek
City Attorney

Date: 2/24/14

Recommended By:

Michael J. Riordan, P.E.
Director, Department of Municipal Development

Date: 2/26/14

Approved By:

Robert J. Perry
Chief Administrative Officer

Date: 3/4/14

MIDDLE RIO GRANDE STORMWATER
MS4 TECHNICAL ADVISORY GROUP
FINAL

Memorandum of Agreement accepted on behalf of:

UNITED STATES AIR FORCE
KIRTLAND AIR FORCE BASE

By _____ Date 28 Dec 15

ERIC H. FROEHLICH, COLONEL,
USAF INSTALLATION COMMANDER

Intergovernmental Agreement Regarding the Operation, Function,

and Funding of the Storm Water Team

THIS AGREEMENT is made and entered into this 27th day of August, 2008, by and among the County of Bernalillo ("COUNTY"), the City of Albuquerque ("COA"), the Albuquerque Metropolitan Arroyo Flood Control Authority ("AMAFCA"), the New Mexico Department of Transportation ("NMDOT"), the Southern Sandoval County Arroyo Flood Control Authority ("SSCAFCA"), and the Ciudad Soil and Water Conservation District ("CIUDAD"), all political subdivisions of the State of New Mexico, and the University of New Mexico ("UNM"), a state educational institution, individually referred to as "Party" and collectively referred to as "Parties."

WITNESSETH:

WHEREAS, the National Pollution Discharge Elimination System (NPDES) storm water discharge permits for small and large municipal separate storm sewer systems ("MS-4") include a minimum control measure regarding public outreach and education; and

WHEREAS, this minimum control measure requires each permittee to develop and distribute educational materials to the community or conduct equivalent public outreach activities about the impacts of storm water discharges on receiving water bodies and the actions that the public can take to reduce pollutants in storm water runoff; and

WHEREAS, COA, AMAFCA, NMDOT, and UNM, co-permittees of a MS-4 Phase I permit, and the COUNTY, a permittee of a Phase II permit, entered into a Cooperative Agreement dated October 20, 2005 in order to accomplish said public outreach and education, and the group informally became known as the Storm Water Team; and

WHEREAS, the Storm Water Team hired a Storm Water Quality Education Coordinator ("Coordinator") to help develop a public education campaign and produce public service announcements including print materials for distribution, and that contract expires November 2008; and

WHEREAS, SSCAFCA desires to combine efforts to educate the public on storm water quality as required in their Phase II storm water discharge permit, and to become one of the participating agencies of the Storm Water Team; and

WHEREAS, CIUDAD desires to combine efforts to educate the public on storm water quality as part of their Watershed Restoration Action Strategy, and to become one of the participating agencies of the Storm Water Team; and

WHEREAS, SSCAFCA and CIUDAD both desire to provide funding as part of their membership to the Storm Water Team; and

WHEREAS, each Party has an interest in reducing pollution and/or meeting storm water permit requirements within their respective boundaries, which are shown in Exhibit 1; and

WHEREAS, with new members being added, it is appropriate to enter into this Agreement in order to formalize the Storm Water Team mission and function, and establish future funding streams.

THEREFORE IN CONSIDERATION OF THE PROMISES AND COVENANTS CONTAINED HEREIN, THE PARTIES HERETO AGREE AS FOLLOWS:

1. The Storm Water Team ("Team") will include all members that have signed a Cooperative Funding Agreement, comply with its terms and continue to fund the team. Additional non-voting members will include other agencies, organizations, or individuals that will provide technical assistance needed to allow the Team to accomplish its mission.
2. The Team will serve as the focal point on public education and outreach regarding storm water quality in the Albuquerque Reach of the Rio Grande watershed, which is

the area that drains to the Rio Grande between Algodones and Isleta Pueblo. The Team mission statement is hereby agreed to by the Parties:

The Storm Water Team is a multi-agency committee dedicated to providing public education and awareness regarding storm water pollution and how to reduce debris and other pollutants in the Albuquerque Reach of the Rio Grande and its tributary arroyos.

3. The Team will have an Executive Committee made up of one voting member from each Party in good standing, which is defined as having paid their expected contribution, as described in Section 4. Each Party in good standing will designate a staff member to be on the Executive Committee. Other staff liaisons will be assigned to the Team as necessary to support the Team mission. Other/outside agencies may participate on the Team by attending meetings and giving input; however, only the Executive Committee may vote on Team decisions. The purpose of the Executive Committee will be to administer and direct the Team and Coordinator in accordance with the provisions herein. Decisions of the Executive Committee will be decided by majority vote of the Executive Committee.

4. Each Party agrees to provide payment for Fiscal Year 2009 in the amount shown in the Contribution Schedule, which may include the value of Executive Committee approved in-kind services, in Attachment A. For subsequent Fiscal Years, the Contribution Schedule may be adjusted by the Executive Committee, including the value of in-kind contributions.

5. AMAFCA will be the fiscal agent for the purposes of this Agreement. All funds will be held in a separate bank account for the purposes of this Agreement. AMAFCA shall make available to any interested Party, all records, receipts, and other

documentation with respect to all matters concerning this Agreement, and shall have this account included in its annual audit.

6. Each Party agrees that a Storm Water Quality Education Coordinator will be hired through the Request for Proposal (RFP) process in advance of the expiration of the current Coordinator's contract. The Coordinator shall be a contractor and not an employee of AMAFCA. Responsibilities included in the Storm Water Quality Education Coordination contract will be to develop and manage a comprehensive educational and awareness campaign, arrange all purchases for deliverables and advertising on behalf of the Team, and make presentations to the public as directed. Each Party will have one representative on the Selection Advisory Committee for the request for proposals process. The Selection Advisory Committee will rank proposals and recommend the top three respondents to the AMAFCA Board of Directors. Upon AMAFCA Board of Directors' approval, AMAFCA will negotiate an agreement with the selected consultant. The Executive Committee will provide input on scope and fees; however, final negotiations and approval will be at AMAFCA's sole discretion.

7. The Parties agree that the Storm Water Quality Education Coordination contract is an ongoing program. The effectiveness of the Storm Water Quality Education Coordination contract, with regard to the Team mission statement, will be evaluated prior to annual renewal(s) or request for proposals.

8. AMAFCA will invoice each Party for their respective participation, minus the value of any Executive Committee approved in-kind contributions, in July, at the start of the Fiscal Year. Each Party will pay such invoices to AMAFCA within forty-five

(45) days of the date of the invoice. Invoices will be sent to Team members listed in Attachment B.

9. It is intended that the Team's operation and function described in this Agreement are ongoing, subject to continued support and authorized funding by each of the Parties. Each Party has the option to not participate in this Agreement in the future by sending written notice to all the other participating Parties at or before the expiration of the Fiscal Year. In such event, the terminating Party shall not be entitled to return of any contribution(s) made under this Agreement; and this Agreement shall remain in full force and effect by and among the remaining Parties.

10. The Team may accept one-time contributions from outside funding sources, to be used to support the Team mission. The Executive Committee will consider the requested uses of such one-time contributions and will ensure the uses are consistent with the Team's ongoing public outreach and education program. Such contributions shall not constitute voting privileges on the Executive Committee.

11. The Parties agree that effort will be expended within the respective boundaries of each participating agency, proportional to funding contributions.

12. If any situation arises which adversely affects any Party's participation in this Agreement, said Party will immediately, and in writing, notify the other Parties. Any circumstance that materially affects this Agreement will be promptly and equitably resolved by all Parties and if necessary, an amendment to this Agreement shall be executed.

13. The obligations of each Party under this Agreement shall be performed in compliance with all applicable laws, statutes and ordinances. Nothing herein is intended to

constitute any agreement for the Parties to perform any activity in violation of the Constitution or Laws of the State of New Mexico or the Ordinances of any entity that is a Party to this Agreement.

14. If any clause or provision in this Agreement is illegal, invalid or unenforceable, under present or future laws effective during the term of this Agreement, then and in that event, it is the intention of the parties hereto that the remainder of this Agreement shall not be affected thereby.

15. It is specifically agreed among the Parties that this Agreement does not, and is not intended to, create in the public, or any member thereof, any rights whatsoever, such as but not limited to, the rights of a third Party beneficiary, nor to authorize anyone not a Party to this Agreement to maintain a suit for wrongful death or any other claim whatsoever.

16. As among the Parties, each shall be solely responsible for any and all liability from personal injury, including death, or damage to property, arising from any negligent or intentional act or failure to act of the respective Party, its officials, agents, contractors or employees pursuant to this Agreement. Liabilities of each Party shall be subject to the immunities and limitations of the Tort Claims Act, §§41-4-1, et seq., NMSA, 1978, and any amendments thereto. By entering into this Agreement, the COUNTY and its "public employees" as defined in the New Mexico Tort Claims Act, the COA and its "public employees" as defined in the New Mexico Tort Claims Act, AMAFCA and its "public employees" as defined in the New Mexico Tort Claims Act, NMDOT and its "public employees" as defined in the New Mexico Tort Claims Act, UNM and its "public employees" as defined in the New Mexico Tort Claims

Act, SSCAFCA and its "public employees" as defined in the New Mexico Tort Claims Act, and CIUDAD and its "public employees" as defined in the New Mexico Tort Claims Act, do not waive sovereign immunity, do not waive any defense and/or do not waive any limitation of liability pursuant to law. No provision in this Agreement modifies and/or waives any provision of the New Mexico Tort Claims Act.

17. The effective date of this Agreement shall be the latest date of approval by all of the interested Parties.

18. Upon approval by all Parties, the covenants, terms and conditions of this Agreement shall be binding upon and inure to the benefit of the Parties hereto, their successors and assigns.

IN WITNESS WHEREOF, the undersigned have caused this Agreement to be executed as of the day and year set forth above.

Albuquerque Metropolitan Arroyo Flood Control Authority

Date: March 20, 2008

Danny Hernandez
Chair of the Board of Directors

Attest:

Tim Eichenberg,
Secretary/Treasurer

Date: March 20, 2008

County of Bernalillo

Date: 5/22/08

Thaddeus Lucero, County Manager

Approved As To Form Only:

Deborah Seligman,
Assistant County Attorney

Date: 5/19/2008

Recommended By:

Tom Zdunek
~~XXXXXXXX~~, Deputy County Manager
Public Works Division

Date: 5/21/8

BC CCN 2008-0264

Intergovernmental Agreement Regarding the Operation, Function,

and Funding of the Storm Water Team

City of Albuquerque

Approved As To Form Only:

City Attorney

Date: 5-12-8

Recommended By:

John Castillo, Director

Date: 5/13/08

Approved By:

Dr. Bruce Perlman, Chief Administrative Officer

Date: 5/16/08

University of New Mexico

Recommended By:

Donna K. Smith
Director, Safety & Risk Services

Date: 4-23-8

Approved As To Form Only:

Richard Mertz
Associate University Counsel

Date: 4/29/08

Approved By:

David W. Harris
Executive Vice President for Administration

Date: 5/1/08

New Mexico Department of Transportation

Approved As To Form Only:

G Chappelle

Office of the General Counsel

Date: 5/22/08

Approved By:

Larry Velasquez, NMDOT District Three Engineer

Date: 8/28/08

Ciudad Soil and Water Conservation District

Date: April 7, 2008

Lauro Silva

Lauro Silva, Chair

Approved as to Form:

Bernard P. Metzgar
SSCAFCA Attorney

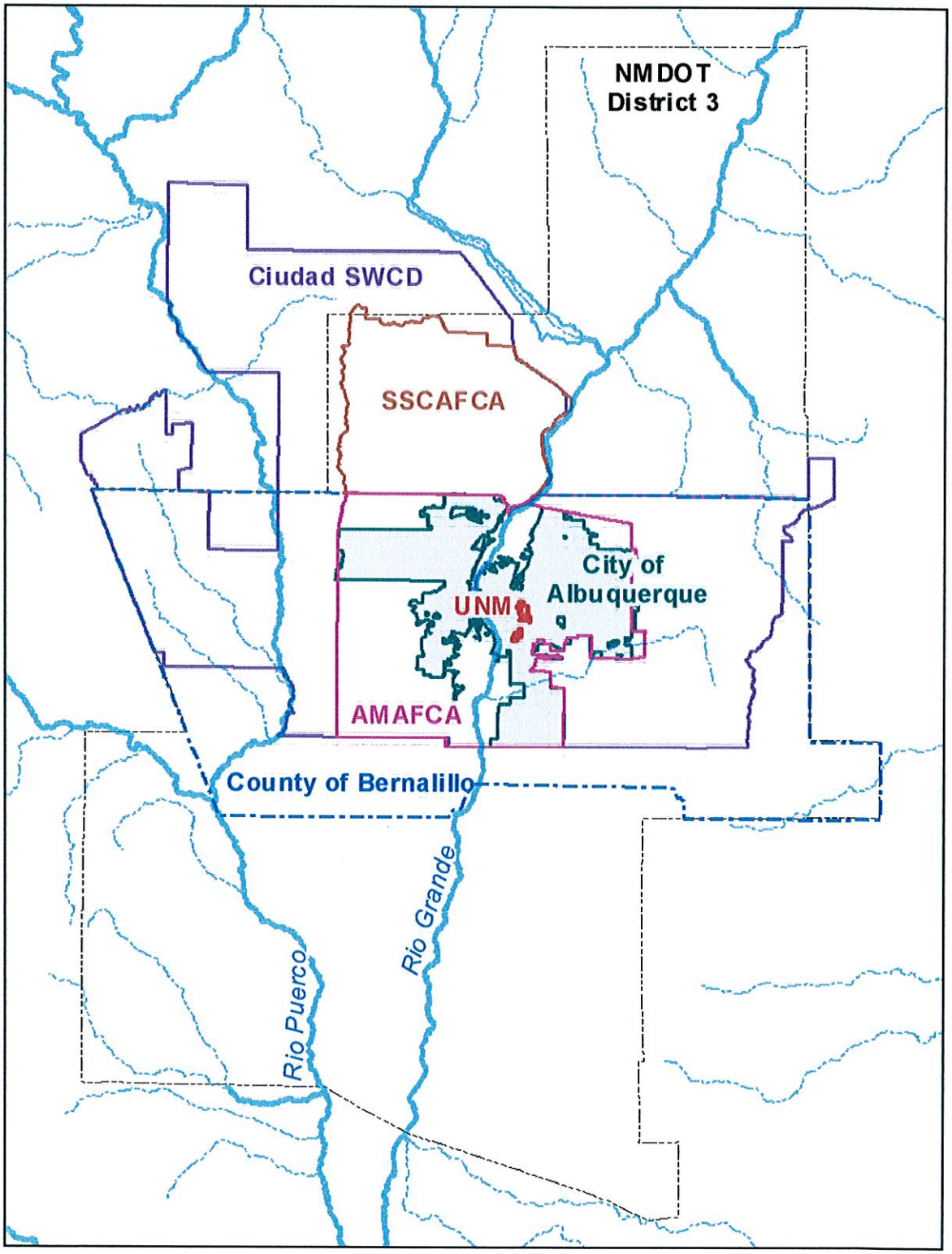
Date: 4/18/08

Southern Sandoval County
Arroyo Flood Control Authority

Date: 5/2/08

John Chaney, Chairman

Exhibit 1
Boundaries of Participating Agencies



Storm Water Team Intergovernmental Agreement – Attachment A

STORM WATER TEAM CONTRIBUTIONS

		Date received by AMAFCA	
FY 05			
AMAFCA	$10,000	12/01/2004	
City of Albuquerque	10,000	04/28/2005	
County of Bernalillo	10,000	12/02/2004	
UNM	7,000*	07/19/2005	* $5,000 in cash, $2,000 in KNME video
NMDOT	10,000	05/26/2005	
Total	**$47,000**		
FY 06			
AMAFCA	$10,000	12/23/2005	
City of Albuquerque	10,000	01/23/2006	
County of Bernalillo	10,000	06/29/2006	
UNM	7,000	02/02/2006	
NMDOT	10,000	06/29/2006	
Total	**$47,000**		
FY 07			
AMAFCA	$10,000	03/21/2007	
City of Albuquerque	10,000	06/13/2007	
County of Bernalillo	10,000	02/11/2008	
UNM	7,000	05/22/2007	
NMDOT	10,000	04/02/2008	
Total	**$47,000**		
FY 08			
AMAFCA	$10,000	10/03/2007	
City of Albuquerque	10,000	09/25/2007	
County of Bernalillo	10,000	03/18/2008	
UNM	7,000	12/10/2007	
NMDOT	10,000	04/02/2008	
Total	**$47,000**		
FY 09 Expected Contributions			
AMAFCA	$10,000		
City of Albuquerque	10,000		
County of Bernalillo	10,000		
UNM	7,000		
NMDOT	10,000		
SSCAFCA	10,000		
Ciudad	10,000		
Total	**$67,000**		

Storm Water Team Intergovernmental Agreement – Attachment B

STORM WATER TEAM CONTACT ADDRESSES

Christy Burton
AMAFCA
2600 Prospect Ave NE
Albuquerque, NM 87107

cc Irene Jeffries (same address)
on invoices

Storm Drainage Section
Dept. of Municipal Development
Attn: Kathy Verhage
P.O. Box 1293, Rm. 301
Albuquerque, NM 87103

cc Roland Penttila (same address)
on invoices

Vern Hershberger
Safety & Risk Services
1 University of New Mexico
MSC07 4100
Albuquerque, NM 87131

Send original invoices to:
Accounts Payable
1 University of New Mexico
MSC01 1290
Albuquerque, NM 87131

Carol Moritz, Administrative Manager
Ciudad Soil & Water Conservation District
6200 Jefferson NE, Room 125
Albuquerque, NM 87109

Kathy Trujillo
New Mexico Department of Transportation
District 3
PO Box 91750
Albuquerque, NM 87199-1750

Patricia Dominguez
Bernalillo County
Public Works Division
2400 Broadway Blvd SE
Bldg N
Albuquerque, NM 87102

cc Mary Murnane (same address)
on invoices

David Stoliker
SSCAFCA
1041 Commerical N.E.
Rio Rancho, New Mexico 87124

Middle Rio Grande Stormwater MS4 Compliance Monitoring Cooperative

INTERGOVERNMENTAL AGREEMENT

AN INTERGOVERNMENTAL AGREEMENT, CREATING THE MIDDLE RIO GRANDE MS4 COMPLIANCE MONITORING COOPERATIVE, IN SUPPORT OF COMPLIANCE EFFORTS FOR A STORMWATER DISCHARGE PERMITTING SYSTEM FOR THE MIDDLE RIO GRANDE VALLEY IN ACCORDANCE WITH THE FEDERAL CLEAN WATER ACT.

RECITALS

WHEREAS, the United States Environmental Protection Agency (EPA), Region 6 regulates the discharge of stormwater from municipal separate storm sewer systems (MS4s) in central New Mexico through the issuance of an MS4 permit for the Middle Rio Grande valley urbanized area, under the authority of the National Pollutant Discharge Elimination System (NPDES) regulations (40CFR122); and

WHEREAS, the Middle Rio Grande valley urbanized area is comprised of many diverse local, state, federal and tribal entities, each with separate and distinct authority and responsibilities; and

WHEREAS, the Middle Rio Grande valley urbanized area entities that are eligible for authorization under NPDES General Permit No. NMR04A000 (hereinafter "MS4 Permit"), and therefore eligible to enter into this Intergovernmental Agreement (hereinafter "Agreement") in furtherance of the requirements of the MS4 Permit, are the City of Albuquerque, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), University of New Mexico, New Mexico Department of Transportation District 3, Bernalillo County, Sandoval County, Village of Corrales, City of Rio Rancho, Village of Los Ranchos de Albuquerque, Kirtland Air Force Base, Town of Bernalillo, State Fairgrounds/Expo New Mexico, Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA), Eastern Sandoval County Arroyo Flood Control Authority (ESCAFCA), Sandia National Laboratories/Department of Energy, Pueblo of Sandia, Pueblo of Isleta, and Pueblo of Santa Ana (collectively "Co-permittees"); and

WHEREAS, the proposed MS4 Permit requires each Co-permittee to obtain and report stormwater compliance monitoring results in their MS4 Annual Report; and

WHEREAS, the proposed MS4 Permit encourages cooperative efforts among the Co-permittees, including compliance monitoring activities, to reduce the amount of pollutants discharged with stormwater into the Rio Grande; and

WHEREAS, cooperation among the Co-permittees in the MS4 Permit through the Middle Rio Grande Compliance Monitoring Cooperative ("CMC"), with regard to monitoring requirements, offers the opportunity to reduce each individual Co-permittee's monitoring costs by cooperatively developing, funding, and executing a common monitoring plan without reducing the effectiveness of the monitoring plan.

a Members cash contribution, provided however, that participation in the CMC shall not be considered in-kind contributions. The value of in-kind contributions will be determined by the membership of the CMC by equating the value of the service to the cost that would be paid by the membership of the CMC to have the in-kind service performed by a third party (non-CMC member) contractor. The Contribution Schedule is located in Attachment 1 to this Agreement. This Contribution Schedule may be modified by the CMC annually without requiring modification to this agreement, provided however, that it shall be adopted by unanimous vote of the Members. Any funds remaining at the end of the Agreement Year will be carried into the next Calendar Year of this agreement. In such event, the CMC may either elect to retain the excess funds from the prior Calendar Year as a contingency fund, or may lower the annual contribution schedules for that year for all Members in equal proportion, based on the total amount carried forward. In the event a Member does not have the resources to provide full payment for any funds required by the Contribution Schedule, the remaining Members may agree, by unanimous vote, amend the Contribution Schedule if it is in the best interest of the CMC. Each Member's obligations under this Agreement are contingent upon sufficient appropriations being made therefor by such Member's governing body sufficient to fulfill such Member's said obligations. If such appropriations are insufficient to such Member's obligations hereunder, such Member's shall promptly notify the other Members, and this Agreement shall terminate forthwith with respect to such Member.

7. **FISCAL AGENT**. The Members shall select one (1) Co-permittee to act as Fiscal Agent for the CMC for the purposes of this Agreement. The Fiscal Agent shall act as the custodian of the CMC's funds, securities, and property. All funds will be held in a separate bank account for the purposes of this Agreement. All CMC funds shall be deposited promptly by the Fiscal Agent to the credit of the CMC. The CMC shall adhere to the Fiscal Agent's accounting and procurement procedures, provided such procedures comply with law. The Fiscal Agent shall make available to any interested Member, all records, receipts, and other documentation with respect to all matters concerning this agreement and shall have this account included in its annual audit. The Fiscal Agent shall maintain funds in accordance with all applicable state and Federal statutes. The Fiscal Agent shall be authorized on the CMC's behalf to sign checks, drafts, or other instruments for payment of money, acceptances, notes, or other evidences of indebtedness, to enter into contracts, or to execute and deliver other documents and instruments. This authority to enter into any contract or negotiated agreement shall be subject to approval by the CMC and subject to any limitations as set forth in this Agreement. Subject to the provisions of this Agreement, no loans shall be contracted on behalf of the CMC and no evidence of indebtedness shall be issued in its name unless authorized by a unanimous vote of the CMC Members. In consideration of the in-kind contributions anticipated from the Fiscal Agent, the total financial contribution requirements of the Fiscal Agent's Member agency, under any applicable agreement, shall be credited by the sum of one thousand dollars ($1,000.00) for the term of the permit in which that Member serves as the Fiscal Agent.

8. **PAYMENTS.** The Fiscal Agent will invoice each Member for their respective participation, minus the values of any CMC approved in-kind contributions at the start of each member entity's Fiscal Year. Each Member will pay such invoices to the Fiscal Agent within

standing of the CMC, contracts may be used, with concurrence from all Members of the CMC, that have been issued by Members to perform elements of the monitoring program. If a contractor is used that has been procured by a Member in good standing of the CMC instead of the Fiscal Agent, then, with concurrence of the other Members of the CMC, an entity that is not the Fiscal Agent for the CMC may contract to have the services performed and upon successful completion of the services, submit an invoice, with no mark-up, to the Fiscal Agent for reimbursement. Reimbursement shall only be authorized for reasonable and necessary costs. All contractor's utilized for the purposes identified in this Agreement shall be procured in accordance with the State Procurement Code. Contractors will be agents of the Member issuing the contract. Other Members of the CMC shall not be bound by the terms of the contract.

13. **EVALUATION.** The Members agree that the Stormwater Monitoring contract is an ongoing program. The effectiveness of the Stormwater Monitoring contract, with regard to permit compliance, will be evaluated by the CMC prior to annual renewal(s) or request for proposals.

14. **LIMITATION ON SAMPLING ACTIVITIES.** The contractor's scope of services will be limited to the CMC-developed and EPA approved sampling plan and associated reporting. If, in the event of an exceedence during routine monitoring events, additional investigation is required by the EPA to identify the source of a potential contaminant, the CMC may expand monitoring activities to the degree necessary to locate the likely entry point of the potential contaminants. Once the likely entry point is identified, further investigation into the source of the potential contaminant will become the responsibility of the specific Co-permittee(s) having jurisdiction at the location where the likely entry occurred. The CMC shall have no responsibility, fiscal or otherwise, to investigate potential sources of contamination outside of the river or its affiliated Middle Rio Grande Conservancy District-owned water conveyances.

15. **PARTICIPATION AFFECTED.** If any situation arises which adversely affects any Member's participation in this Agreement, said Member will immediately, and in writing, notify the other Members. Any circumstance that materially affects this Agreement will be promptly and equitably resolved by all Members and if necessary, an amendment to this Agreement shall be executed.

16. **COMPLIANCE WITH GOVERNING LAWS.** The obligations of each Member under this Agreement shall be performed in compliance with all applicable laws, statues, and ordinances. Nothing herein is intended to constitute any agreement for the Members to perform any activity in violation of the Constitution or Laws of the State of New Mexico or the Ordinances of any Co-permittee that is a Member of this Agreement.

17. **SEVERABILITY.** If any clause or provision of this Agreement is illegal, invalid or unenforceable, under present or future laws effective during the term of this Agreement, then and in that event, it is the intention of the Members hereto that the remainder of this Agreement shall not be affected thereby.

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

Albuquerque Metropolitan Arroyo Flood Control Authority

Bruce M. Thomson, Chair
Board of Directors

6/23/2016
Date

Attest:

Ronald D. Brown, Secretary-Treasurer
Board of Directors

Approved as to Form:

Randy Autio
AMAFCA Attorney

Date: 6/23/16

City of Rio Rancho

Keith Riesberg
City Manager

5/27/16
Date

Approved as to Form:

Jennifer Vega-Brown
City Attorney

Date: 5/26/16

Date for of beginning of Fiscal Year: July 1

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

City of Albuquerque

Approved as to Form

Jessica M. Hernandez
City Attorney

6/15/16
Date

Purchasing Approval
:

Ramona Martinez
Chief Procurement Officer

6/16/16
Date

Recommended By:

Melissa Lozoya
Director, Department of Municipal Development

6/16/16
Date

Approved By

Robert J. Perry
Chief Administrative Officer

6/17/16
Date

Date for of beginning of Fiscal Year: July 1

ATTACHMENT 1

CONTRIBUTION SCHEDULE

CCN 2016-0407

County of Bernalillo:

APPROVED BY:

6-28-16
Julie M. Baca Date
Bernalillo County Manager

RECOMMENDED BY:

6/27/16
Roger A. Paul, P.E. Date
Deputy County Manager for Public Works

APPROVED AS TO FORM ONLY:

4-24-2016
for Deputy County Attorney Date

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

Village of Los Ranchos de Albuquerque

Kelly S. Ward 6/21/16

Kelly Ward Date
Administrator

Village of Corrales

Scott A. Kominiak, Mayor

5/26/16
Date

Jennifer A. Luce, Village Clerk

Approved as to Form:

John L. Appel
Coppler Law Firm P.C.
Village of Corrales Attorney

5/26/16
Date

Date for beginning of Fiscal Year: July 1

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

Town of Bernalillo

Jack Torres, Mayor
Board of Directors

5/23/2016
Date

Attest:

Ida Fierro, Town Clerk

Date for of beginning of Fiscal Year: July 1

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

Southern Sandoval County Arroyo Flood Control Authority

James Fahey, M.D., Chair
Board of Directors

5/20/16
Date

Approved as to Form:

Bernard Metzgar
SSCAFCA Attorney

Date: 5/20/16

Date for of beginning of Fiscal Year: July 1

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

Sandoval County, New Mexico
Flood Control Authority

Phillip Rios
County Manager

5/16/2016
Date

Approved as to Form:

Patrick Trujillo
Sandoval County Attorney

Date: 5/16/2016

Date for of beginning of Fiscal Year: July 1

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

New Mexico Department of Transportation - District 3

Approved as to Form:

Elizabeth J. Jarvis
Office of the General Counsel

6·29·2016
Date

Approved By:

Kenneth Murphy
Kenneth Murphy, NMDOT District Three Engineer

7/7/16
Date

Date for of beginning of Fiscal Year: July 1

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

University of New Mexico

for Elizabeth Metzger Univ. Controller 7-19-16
David W. Harris Date
Executive Vice President for Administration, COO & CFO

Approved:

Carla P. Domenici 7-14-16
Carla P. Domenici Date
Director, Safety and Risk Services

Approved as to Form:

for
Elsa K. Cole, Esq.
University Counsel

7/15/2016
Date

Date for of beginning of Fiscal Year: July 1

ATTACHMENT 1

CONTRIBUTION SCHEDULE

EACH ENTITY WILL EXECUTE AGREEMENT INDIVIDUALLY. SIGNATURE PAGES WILL BE CONSOLIDATED INTO SINGLE DOCUMENT

Eastern Sandoval County Arroyo Flood Control Authority

Sal Reyes, Chair
Board of Directors

Date May 25 2016

Attest:

Ida Fierro, Secretary
Board of Directors

Approved as to Form:

Bernie Metzgar
ESCAFCA Attorney

Date: _____

ATTACHMENT 1

Sampling Cooperative Cost Allocation Determination (CAD) Tool

28-Apr-16

Number	Participant			$ 132,000.00	ENTITY PAYMENT	FISCAL AGENT CREDIT ($1k)
1	City of Albuquerque		1.38	$ 45,574.50	$45,600.00	
2	AMAFCA		0.43	$ 14,319.39	$14,400.00	$ (1,000.00)
3	UNM		0.41	$ 13,553.53	$13,600.00	
4	NMDOT		0.12	$ 3,865.56	$3,900.00	
5	Bernalillo County		0.59	$ 19,549.95	$19,600.00	
6	Sandoval County		0.46	$ 15,094.20	$15,100.00	
7	Village of Corrales		0.04	$ 1,393.20	$1,400.00	
8	City of Rio Rancho		0.42	$ 13,997.46	$14,000.00	
9	Los Ranchos de Albuquerque		0.02	$ 705.79	$1,000.00	
10	Town of Bernalillo		0.03	$ 903.81	$1,000.00	
11	ESCAFCA		0.01	$ 338.88	$500.00	
12	SSCAFCA		0.08	$ 2,703.72	$2,900.00	
	Ratio Check (Sum = Weighting Factor)		4.00		$132,000.00	

MONITORING ACTIVITIES

(see separate file for results)

Southern Sandoval County Arroyo Flood Control Authority

1041 Commercial Drive SE • Rio Rancho, NM 87124
Ph (505) 892-RAIN (7246) • Fax (505) 892-7241

August 7, 2017

Mr. Jerry Lovato, Executive Engineer
Albuquerque Metropolitan Arroyo Flood Control Authority
2600 Prospect Ave NE
Albuquerque, NM 87107

RE: Memorandum of Understanding for Delegation of Authority for Data Entry into netDMR System

Dear Mr. Lovato,

As you are aware, twelve of the permittees under NPDES Permit No. NMR04A000 (Permit) have entered into a cooperative agreement for the performance of permit-mandated water quality monitoring. Currently, results from the samples taken during monitoring events are shared among the twelve members of the Compliance Monitoring Cooperative (CMC) and must be entered by each entity into the netDMR database individually, creating twelve identical (barring typos or other data entry error) records. This is clearly inefficient, at best.

Following discussions between the CMC and the EPA, the EPA has approved a methodology whereby one member of the CMC will enter data in netDMR on behalf of any other CMC-member entity. Each CMC-member entity that wishes to participate will delegate authority to the data entry CMC-member entity or their designed contractor, for this purpose. We appreciate Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) volunteering to be the data entry CMC entity on behalf of the CMC.

Therefore, the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA), permit number NMR04A001, hereby delegates authority for data entry and approval of sampling results into netDMR to AMAFCA for the purposes of compliance with Permit requirements. Please provide us notification of the completion of data entry via email for our records.

In the event that AMAFCA becomes unable to perform this function on behalf of SSCAFCA, please notify me a minimum of 60 days prior to the deadline for date entry so that we may arrange to perform this function internally.

If you have any questions or need any clarification regarding this letter, please feel free to contact me at cthomas@sscafca.com or at 505-892-7246. Thank you again for your willingness to perform this operation on behalf of the membership of the CMC.

Requested
Charles Thomas, P.E.
Executive Engineer, SSCAFCA

Acknowledged and Accepted
Jerry Lovato, P.E.
Executive Director, AMAFCA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

RECEIVED APR 25 2017

APR 10 2017

CERTIFIED MAIL – RETURN RECEIPT REQUESTED: 7014 0150 0000 2454 3244

Mr. Dave Gatterman, P.E.
Southern Sandoval County
Arroyo Flood Control Authority
1041 Commercial Dr. S.E.
Rio Rancho, NM 87124

Re: Request for Delegation of Entering Data

Mr. Gatterman:

Thank you for your email of February 8, 2017, requesting that the Middle Rio Grande member for entering monitoring events data into NetDMR on behalf of the other members. It is our understanding that Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) will be the member who will be inputing the data. EPA approves CMC's request for the delegation because it is efficient and not duplicative. While we approve the CMC's request for the delegation, EPA would like to emphasize a few items.

EPA's NPDES Permits and TMDLs Branch has pointed out that AMAFCA has certain obligations:

- If AMAFCA agrees to enter monitoring events data on the permittees' (CMC member entities) behalf, this should be memorialized in a Memorandum of Agreement (MOA) or its equivalent. AMAFCA must maintain this obligation as part of their SWMP description and it should also be incorporated into the AMAFCA's SWMP.

- The CMC's SWMPs should also indicate that AMAFCA is responsible for implementing this action.

EPA's Water Enforcement Branch would also like to highlight Part I D.3.b of the Middle Rio Grande MS4 Permit requirements regarding Shared Responsibility and cooperative Programs, and Part IV.A of the MS4 Permit regarding Standard Permit Conditions and Duty to Comply.

- **Part I D.3.b** states that Implementation of the SWMP may be achieved through participation with other permittees, public agencies, or private entities in cooperative efforts to satisfy the requirements of Part I. D in lieu of creating duplicate program elements for each individual permittee, only if:

-

> "(c) The permittee remains responsible for compliance with the permit obligations if the other entity fails to implement the control measure component."

- **Part IV A** states that the permittee(s) must comply with all conditions of this permit insofar as those conditions are applicable to each permittee, either individually or jointly. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action.

As stated above, please note that each permittee is responsible for meeting its own permit obligations. If you have any questions, please contact Robert Houston, Special Projects Section Chief, at (214) 665-8565.

Sincerely,

Cheryl T. Seager
Division Director
Compliance Assurance and
Enforcement Division

PUBLIC OUTREACH AND EDUCATION

(see separate file for Outcomes Report)

Xeriscape
Council of New Mexico

Chuck,

Thank you for your support and sponsorship of the 2017 Land & Water Summit, "Growing Community Relationships: *Just Add Water!*". We had a very diverse population of attendees this last year and I wanted to share the information with you.

Profession	*No. Attending*
Landscape Architect / Designer	29
Landscape Contractor / Nursery	11
Professional Engineer	14
Architect	1
Planner	5
Policy	4
Agriculture	2
Stormwater	5
Water Conservancy / Environment	8
City / County / Government	18
Utility	6
Educator	11
Student	11
Supplier	5
Citizen	13
Other	3
Total	**146**

As you know, producing a high-caliber conference such as the Land & Water Summit is costly. It is through continued sponsorship, such as yours, that makes this conference such a success with attendees from not only New Mexico, but also coming from neighboring states such as Texas, Oklahoma, Arizona, and Colorado.

We look forward to continuing our partnership with you for the 2018 Land & Water Summit, "The Ripple Effect: Stormwater & Tree Canopy".

Marian Wrage
Secretary, Xeriscape Council of New Mexico