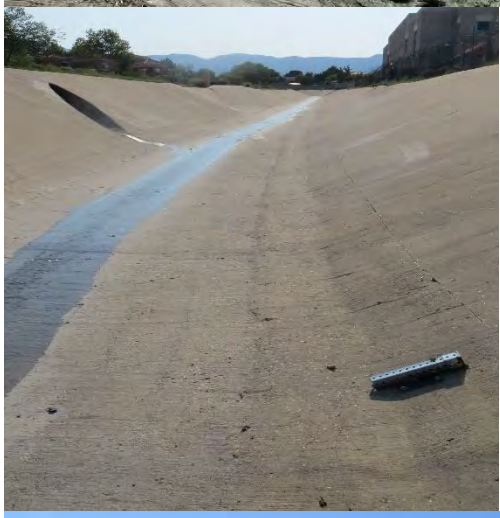
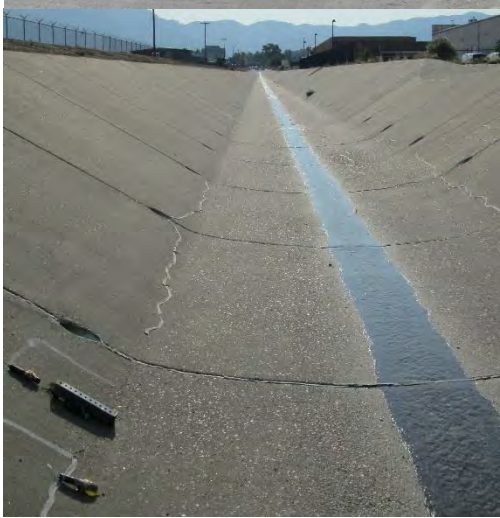
LEVELOGGER REPORT FOR NOVEMBER 2021 – FEBRUARY 2022





JUNE 30, 2022

Prepared for:

AMAFCA
2600 Prospect Avenue NE
Albuquerque, NM 87107

Prepared by:

Bohannan Huston
Engineering
Spatial Data
Advanced Technologies

LEVELOGGER REPORT

FOR

NOVEMBER 2021 – FEBRUARY 2022

JUNE 30, 2022

Prepared for:

AMAFCA

2600 PROSPECT AVENUE NE

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I. EXECUTIVE SUMMARY

The four-month period between November 2021 – February 2022 had two storm events that were recorded by the Leveloggers and analyzed for this report. This reporting period is within the FY 2022 dry season. No illicit discharge indicators were detected during the AMAFCA site visits to the 14 Levelogger sites.

II. OVERVIEW OF LEVELOGGER COLLECTION PROGRAM

Bohannan Huston, Inc. (BHI) completed data analysis of 14 AMAFCA Leveloggers installed in the channels contributing stormwater runoff to the North Diversion Channel (NDC). This report summarizes the Levelogger analysis results for data collected in fiscal year (FY) 2022 from November 2021 to February 2022.

The Leveloggers analyzed and reported include, from north to south (see site locations in Figure 1.):

1. North Camino Arroyo
2. La Cueva Arroyo
3. North Domingo Baca
4. North Pino Arroyo
5. South Pino Arroyo
6. Bear Canyon Arroyo
7. Vineyard Arroyo
8. Grantline Arroyo
9. Hahn Arroyo
10. Embudo Arroyo
11. San Mateo Storm Drain Outfall to Embudo
12. Campus Wash
13. Lower Bear – Upstream (Wyoming)
14. Lower Bear – Downstream (Spain)

AMAFCA provided BHI with the compensated Levelogger data for each of the four months discussed in this report. BHI applied the relevant rating curves to the compensated Levelogger data to calculate flow rates and volumes of stormwater runoff recorded at each Levelogger site location during storm events. The rating curves for the Levelogger locations were determined in the *North Diversion Channel Inlets – Hydraulic Analysis* (BHI, 2016), and more recent rating curve analysis related to the Lower Bear locations.

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Author: thuynh

A. LEVELOGGER DATA COLLECTION SUMMARY FOR NOVEMBER 2021 - FEBRUARY 2022

1. LEVELOGGER MONTHLY SITE VISITS

AMAFCA visited each Levelogger site monthly to download collected flow depth data and to replace the deployed instruments with newly maintained Leveloggers. During the Levelogger visits, AMAFCA visually screened each channel for general maintenance needs and signs of illicit discharge. Staining in the channel, oil sheens, presence of foam, and/or dumped debris are typical indicators of potential illicit discharges. Small nuisance flows within the channels are normal and routinely observed within the NDC watershed and are not considered indicative of an illicit discharge.

No signs of illicit discharges were observed during the November 2021 to February 2022 Levelogger collection period site visits. AMAFCA obtained and provided site photos looking upstream and downstream of each Levelogger to document the visual screening and appearance of the channels. All acquired photos are provided by month on pages 5 – 18 for each Levelogger location covered in this report.

Table 1 provides a summary of the number of visual screenings conducted and number of potential illicit discharge indicators observed at each AMAFCA Levelogger site location for this reporting period as well as for the complete FY 2022 (June 2021 – July 2022) time period, to date. This table also provides a cumulative total of both visual screenings completed and number of potential illicit discharge indicators observed during FY 2022, to date.

Table 1: Summary of Visual Screenings and Potential Illicit Discharges Detected

AMAFCA/City of Albuquerque Facility - Levelogger Data Site Location	Number of Visual Screenings July 2021 – July 2022													Cumulative Total of Visual Screenings Completed	Number of Potential Illicit Discharge Indicators Detected			Cumulative Total of Illicit Discharge Indicators Detected
	July 2021	August 2021	September 2021	October 2021	November 2021	December 2021	January 2022	February 2022	March 2022	April 2022	May 2022	June 2022	July 2022		August – Nov. 2021	Dec. 2021 – March 2022	April – July 2022	
North Camino Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
La Cueva Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
North Domingo Baca	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
North Pino Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
South Pino Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Bear Canyon Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Vineyard Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Grantline Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Hahn Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Embudo Arroyo	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
San Mateo Drain	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Campus Wash	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Lower Bear – Upstream (Wyoming)	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**
Lower Bear – Downstream (Spain)	1	1	1	1	1	1	1	1	1					**9**	0	0		**0**

Levelogger data summarized in this report. Site visits retrieve data for the prior month – for example, the March 2022 site visit retrieved the February 2022 Levelogger data.

North Camino Arroyo

December 6, 2021	March 3, 2022
	
Photo 1: North Camino Arroyo – Looking Upstream	**Photo 2: North Camino Arroyo – Looking Upstream**
	
Photo 3: North Camino Arroyo Looking Downstream	**Photo 4: North Camino Arroyo – Looking Downstream**

La Cueva Arroyo

December 6, 2021	March 3, 2022
	
Photo 5: La Cueva Arroyo – Looking Upstream	**Photo 6: La Cueva Arroyo – Looking Upstream**
	
Photo 7: La Cueva Arroyo – Looking Downstream	**Photo 8: La Cueva Arroyo – Looking Downstream**

North Domingo Baca

December 6, 2021	March 3, 2022
	
Photo 9: North Domingo Baca – Looking Upstream	**Photo 10: North Domingo Baca – Looking Upstream**
	
Photo 11: North Domingo Baca – Looking Downstream	**Photo 12: North Domingo Baca – Looking Downstream**

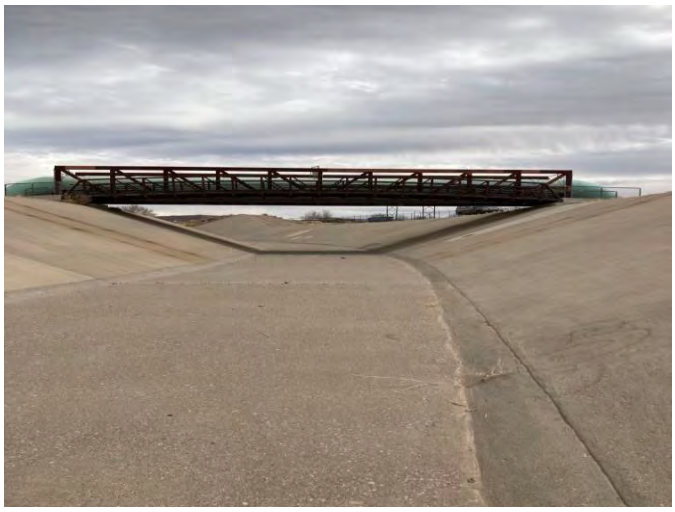
North Pino Arroyo

December 21, 2021	March 3, 2022
	
Photo 13: North Pino Arroyo – Looking Upstream	**Photo 14: North Pino Arroyo – Looking Upstream**
	
Photo 15: North Pino Arroyo – Looking Downstream	**Photo 16: North Pino Arroyo – Looking Downstream**

South Pino Arroyo

December 6, 2021	March 3, 2022
	
Photo 17: South Pino Arroyo – Looking Upstream	**Photo 18: South Pino Arroyo – Looking Upstream**
	
Photo 19: South Pino Arroyo – Looking Downstream	**Photo 20: South Pino Arroyo – Looking Downstream**

Bear Canyon Arroyo

December 6, 2021	March 3, 2022
	
Photo 21: Bear Canyon Arroyo – Looking Upstream	**Photo 22: Bear Canyon Arroyo – Looking Upstream**
	
Photo 23: Bear Canyon Arroyo– Looking Downstream	**Photo 24: Bear Canyon Arroyo– Looking Downstream**

Vineyard Arroyo

December 6, 2021	March 3, 2022
	
Photo 25: Vineyard Arroyo – Looking Upstream	**Photo 26: Vineyard Arroyo – Looking Upstream**
	
Photo 27: Vineyard Arroyo – Looking Downstream	**Photo 28: Vineyard Arroyo – Looking Downstream**

Grantline Arroyo

December 6, 2021	March 3, 2022
	
Photo 29: Grantline Arroyo – Looking Upstream	**Photo 30: Grantline Arroyo – Looking Upstream**
	
Photo 31: Grantline Arroyo – Looking Downstream	**Photo 32: Grantline Arroyo – Looking Downstream**

Hahn Arroyo

December 6, 2021	March 3, 2022
	
Photo 33: Hahn Arroyo – Looking Upstream	**Photo 34: Hahn Arroyo – Looking Upstream**
	
Photo 35: Hahn Arroyo – Looking Downstream	**Photo 36: Hahn Arroyo – Looking Downstream**

San Mateo Storm Drain

December 6, 2021	March 3, 2022
	
Photo 37: San Mateo Storm Drain – Looking Upstream	**Photo 38: San Mateo Storm Drain – Looking Upstream**
	
Photo 39: San Mateo Storm Drain – Looking Downstream	**Photo 40: San Mateo Storm Drain – Looking Downstream**

Embudo Arroyo

December 6, 2021	March 3, 2022
	
Photo 41: Embudo Arroyo – Looking Upstream	**Photo 42: Embudo Arroyo – Looking Upstream**
	
Photo 43: Embudo Arroyo – Looking Downstream	**Photo 44: Embudo Arroyo – Looking Downstream**

Campus Wash

December 6, 2021	March 3, 2022
	
Photo 45: Campus Wash – Looking Upstream	**Photo 46: Campus Wash – Looking Upstream**

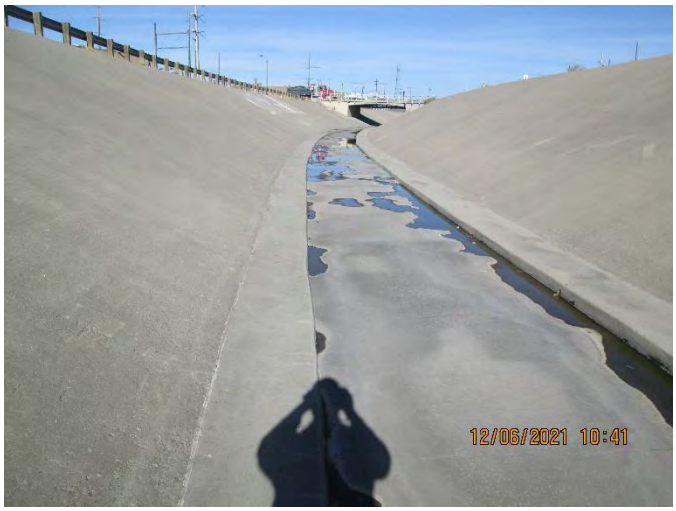



Photo 47: Campus Wash – Looking Downstream	**Photo 48: Campus Wash – Looking Downstream**

Lower Bear – Wyoming (Upstream)

December 6, 2021	March 3, 2022
	
Photo 49: Lower Bear (Wyoming) – Looking Upstream	**Photo 50: Lower Bear (Wyoming) – Looking Upstream**
	
Photo 51: Lower Bear (Wyoming) – Looking Downstream	**Photo 52: Lower Bear (Wyoming) – Looking Downstream**

Lower Bear – Spain (Downstream)

December 6, 2021	March 3, 2022
	
Photo 53: Lower Bear (Spain) – Looking Upstream	**Photo 54: Lower Bear (Spain) – Looking Upstream**
	
Photo 55: Lower Bear (Spain) – Looking Downstream	**Photo 56: Lower Bear (Spain) – Looking Downstream**

2. ANALYSIS APPROACH

All compensated data from the Leveloggers was analyzed and converted to flow data, using the relevant rating curves, for storm events that occurred from November 2021 through February 2022 within each watershed. The Community Collaborative Rain, Hail, & Snow Network (CoCoRaHS) gage total precipitation data near or in each respective watershed was reviewed to determine when storm events occurred. Storm events were compared with the Levelogger flow data results to determine storm hydrographs at each of the Levelogger locations. The CoCoRaHS data for each storm event is shown in each Storm Event figure provided later in this report.

USGS gages within the watershed were also used to view storm event runoff results in nearby locations and to compare to Levelogger results. The U.S. Geological Survey (USGS) stream gages within the NDC watershed were used to verify storm runoff events within the watershed. The “USGS 08329900 North Floodway Channel near Alameda” gage was not operational, and has not been operational since August 12, 2021, due to maintenance. The ”USGS 08329700 Campus Wash at Albuquerque” and “USGS 08329840 Hahn Arroyo in Albuquerque” gages were utilized to review and compare storm event runoff for the Campus Wash and Hahn Arroyo Leveloggers.

3. NOTIFICATION OF NON-STORMWATER FLOWS FROM ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY (ABCWUA)

Albuquerque Bernalillo County Water Utility Authority (ABCWUA) regularly notifies AMAFCA of planned non-stormwater flows into AMAFCA channels (for example, from well maintenance releases). In addition, AMAFCA receives monthly Discharge Monitoring Reports (DMRs) of Sanitary Sewer Overflows (SSOs) from ABCWUA. The notifications from ABCWUA related to the Leveloggers runoff data were reviewed to ensure that non-stormwater flow within AMAFCA channels was not analyzed as stormwater runoff. During this reporting period, the ABCWUA discharged non-stormwater flows intermittently between the dates of February 21-25, 2022 from the Love Well #7 into the Embudo Arroyo in Snow Park near Parisfal Street NE and Indian School Road. This discharge was recorded by the Embudo Levelogger and was not analyzed as a storm event.

III. WATERSHED VIEW – RAINFALL RUNOFF RESPONSE TO STORM EVENTS

The Levelogger and rainfall data were viewed on a watershed basis and are presented in this report using GIS figures. This geospatial analysis and presentation were completed to improve the understanding of storm event rainfall runoff response for the contributing, Levelogger monitored watersheds in the NDC.

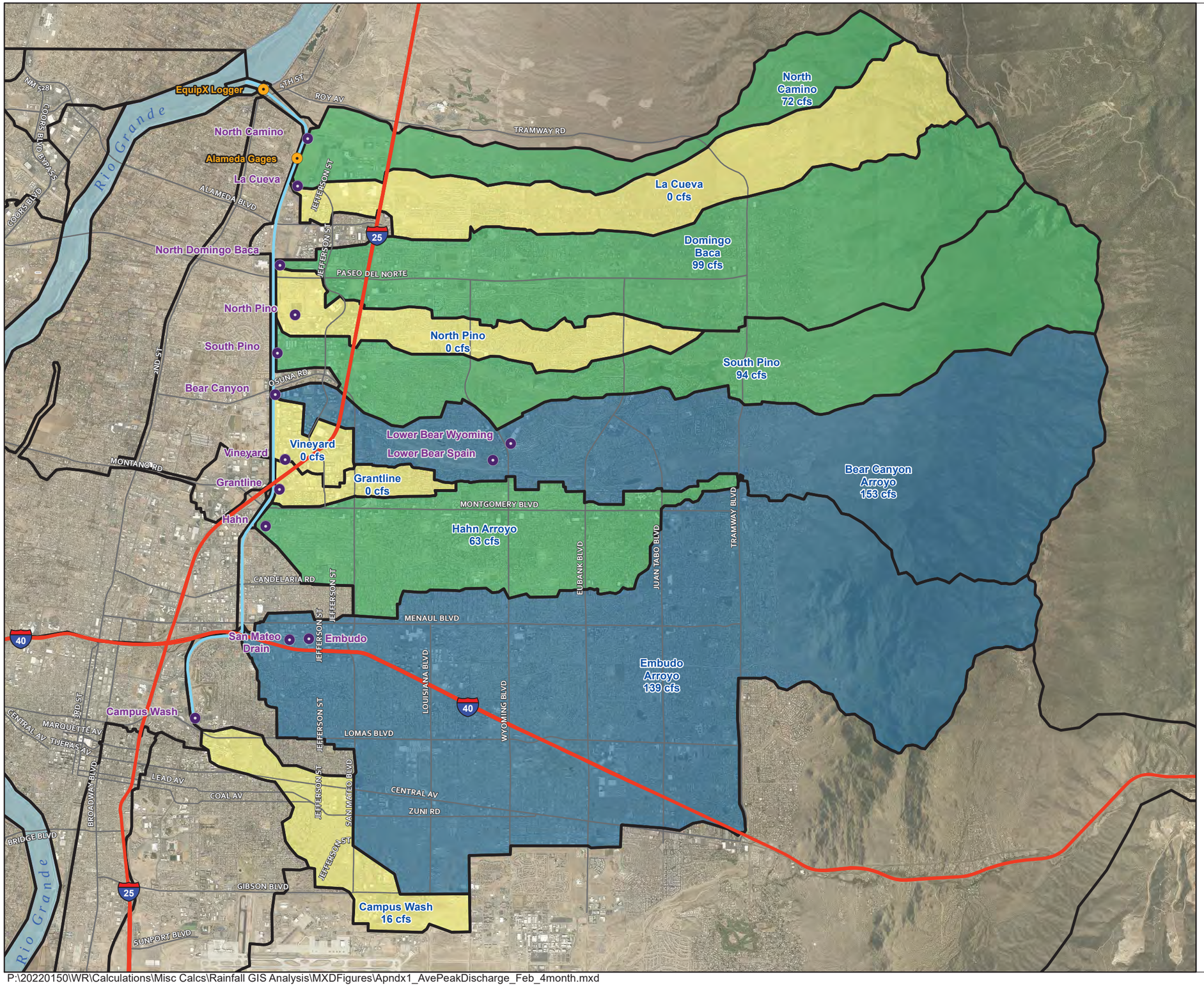
Figure 2 shows the average peak discharge in cubic feet per second (cfs) for all storm events measured by the Leveloggers for the four dry season months reported, November 2021 to February 2022, which provides a view of the relative peak flows monitored for storms in each contributing watershed. During this reporting period, only two storms were recorded by the Leveloggers. Figure 3 shows the average peak discharge measured by the Leveloggers for all storm events during the annual dry season period of November 1 through June 30 from November 2016 to February 2022, which includes 79 storm events and provides a longer term analysis of the relative peak flows monitored for storms during the dry season in each contributing watershed.

Next, the total peak discharge values divided by the total area of each watershed in acres (ac) was calculated. Figure 4 shows the total peak discharge per acre (cfs/ac) for the two storm events measured by the Leveloggers for the four dry season months reported – November 2021 to February 2022. Figure 5 shows this same comparison measured by the Leveloggers for all storm events during the annual dry season period of November 1 through June 30 from November 2016 to February 2022.

The third geospatial analysis shows the summation of the total runoff volume values from the analyzed storm events. Figure 6 provides an overall view of stormwater runoff volume per watershed in acre-feet (ac-ft) for the two storms during the four dry season months reported, November 2021 to February 2022, and Figure 7 shows these values measured by the Leveloggers for all storm events during the annual dry season period of November 1 through June 30 from November 2016 to February 2022. The existing detention facilities within each watershed are included in each of these figures to provide an understanding of stormwater volume storage available within each watershed.

Analysis was completed to relate the measured total runoff volume from the analyzed storm events in acre-feet (ac-ft) to the amount of precipitation received (as reported at the Albuquerque Sunport). Figure 8 shows the total runoff volume per inch of rainfall (ac-ft/in) for the two storm events measured by the Leveloggers for the four dry season months reported, November 2021 to February 2022, for each watershed. Figure 9 shows the total runoff volume per inch of rainfall (ac-ft/in) measured by the Leveloggers for all storm events during

the annual dry season period of November 1 through June 30 from November 2016 to February 2022. The figures also include the existing detention facilities within each watershed to provide an understanding of stormwater volume storage available within each watershed.



Average Peak Discharge (cfs)

Measured by Leveloggers per Watershed Over 4 Dry Season Months (November 2021 - February 2022)

Figure 2

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Average Peak Runoff (cfs)

- 0 - 30
- 31 - 60
- 61 - 100
- 101- 200
- > 201

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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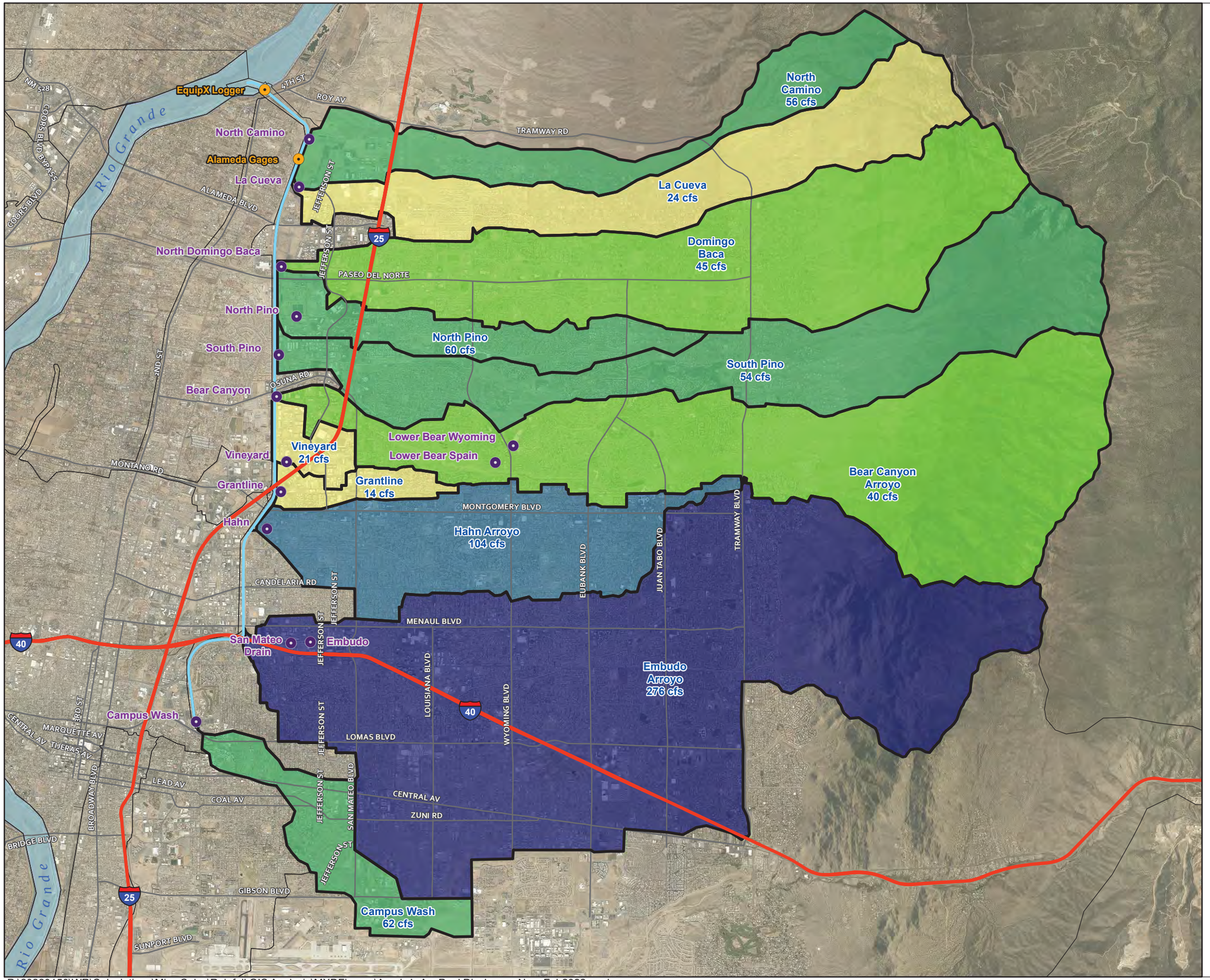
Author: thuynh



Average Peak Discharge (cfs)

Measured by Leveloggers per Watershed During Dry Season Months (November - June) From November 2016 - February 2022

Figure 3

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Average Peak Runoff (cfs)

- 0-30
- 31-50
- 51-65
- 66-110
- >111

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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Author: thuynh

Total Peak Discharge per Acre (cfs/ac)

Measured by Leveloggers per Watershed Over 4 Dry Season Months (November 2021 - February 2022)

Figure 4

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Total Peak Discharge Per Acre (cfs/ac)

- 0
- 0-0.01
- 0.01-0.02
- >0.03

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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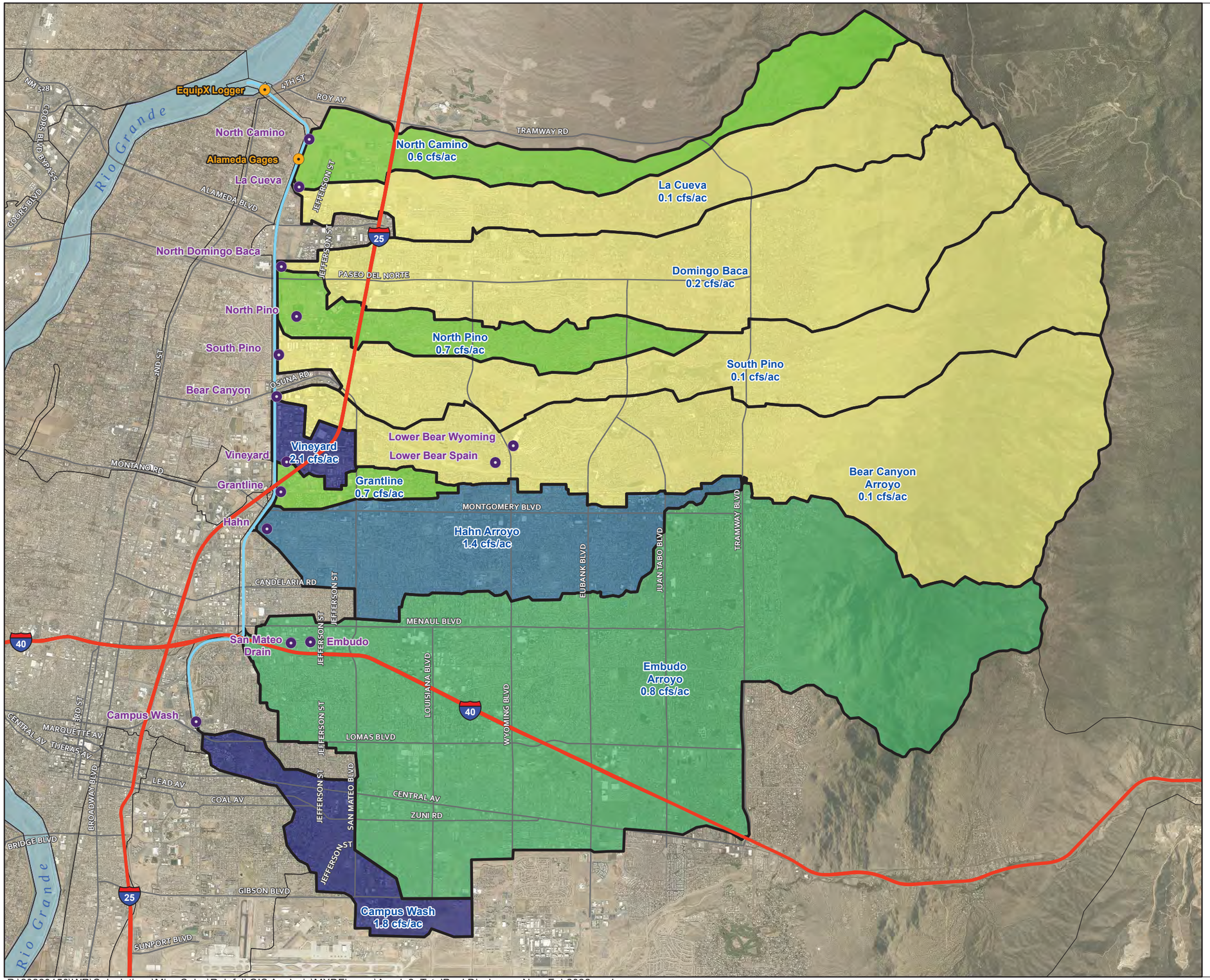
Author: thuynh

Total Peak Discharge per Acre (cfs/ac)

Measured by Leveloggers per Watershed During Dry Season Months (November - June) From November 2016 - February 2022

Figure 5



Total Peak Discharge per Acre (cfs/ac)

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Total Peak Discharge per Acre (cfs/ac)
0.1-0.2
0.3-0.7
0.8-0.9
0.9-1.5
>1.5

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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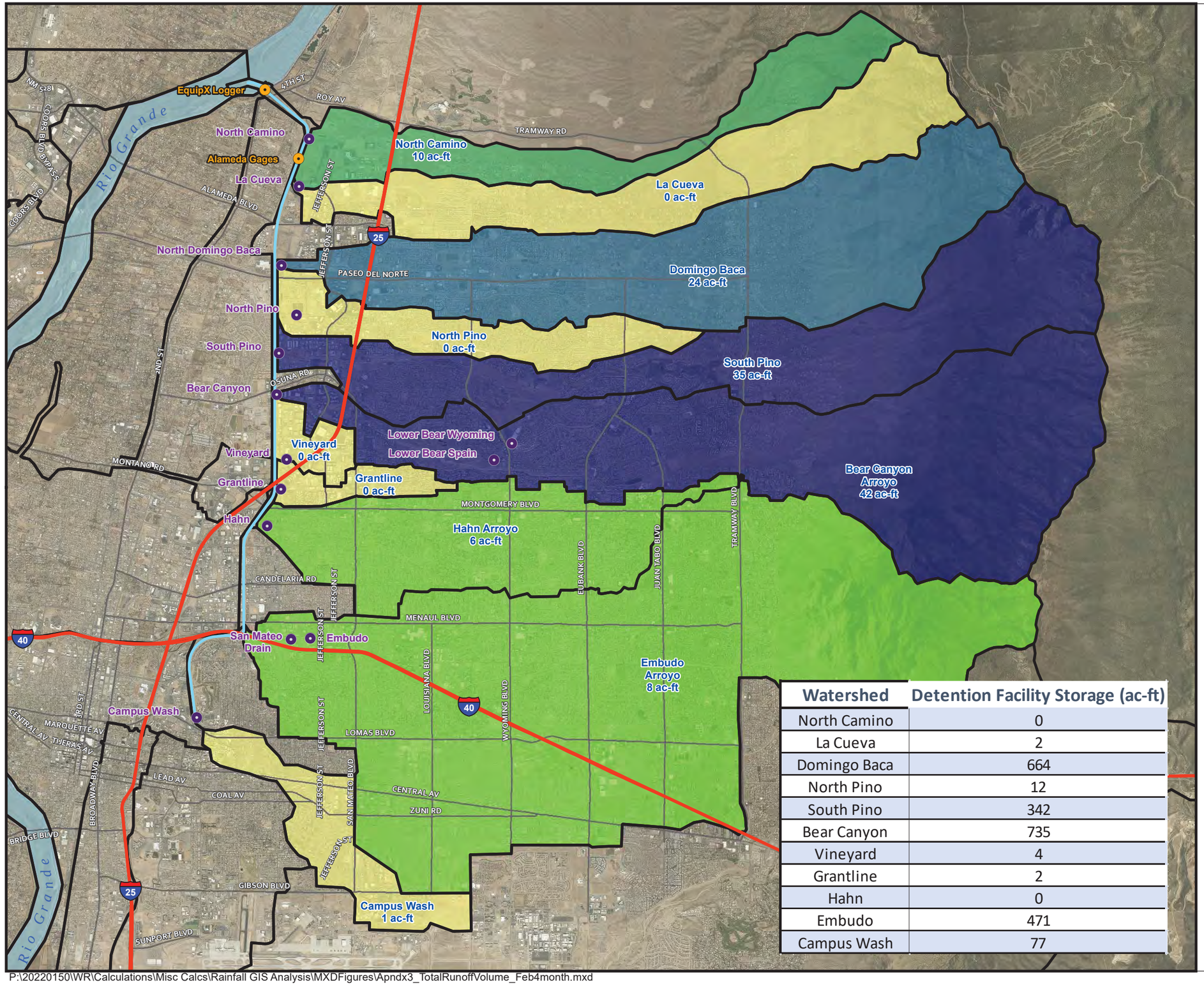
Author: thuynh

Total Runoff Volume (ac-ft)

Measured by Leveloggers per Watershed Over 4 Dry Season Months (November 2021 - February 2022)

Figure 6



Watershed	Detention Facility Storage (ac-ft)
North Camino	0
La Cueva	2
Domingo Baca	664
North Pino	12
South Pino	342
Bear Canyon	735
Vineyard	4
Grantline	2
Hahn	0
Embudo	471
Campus Wash	77

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Total Runoff Volume (ac-ft)

- 0-2
- 3 - 8
- 9-10
- 11 - 23
- >24

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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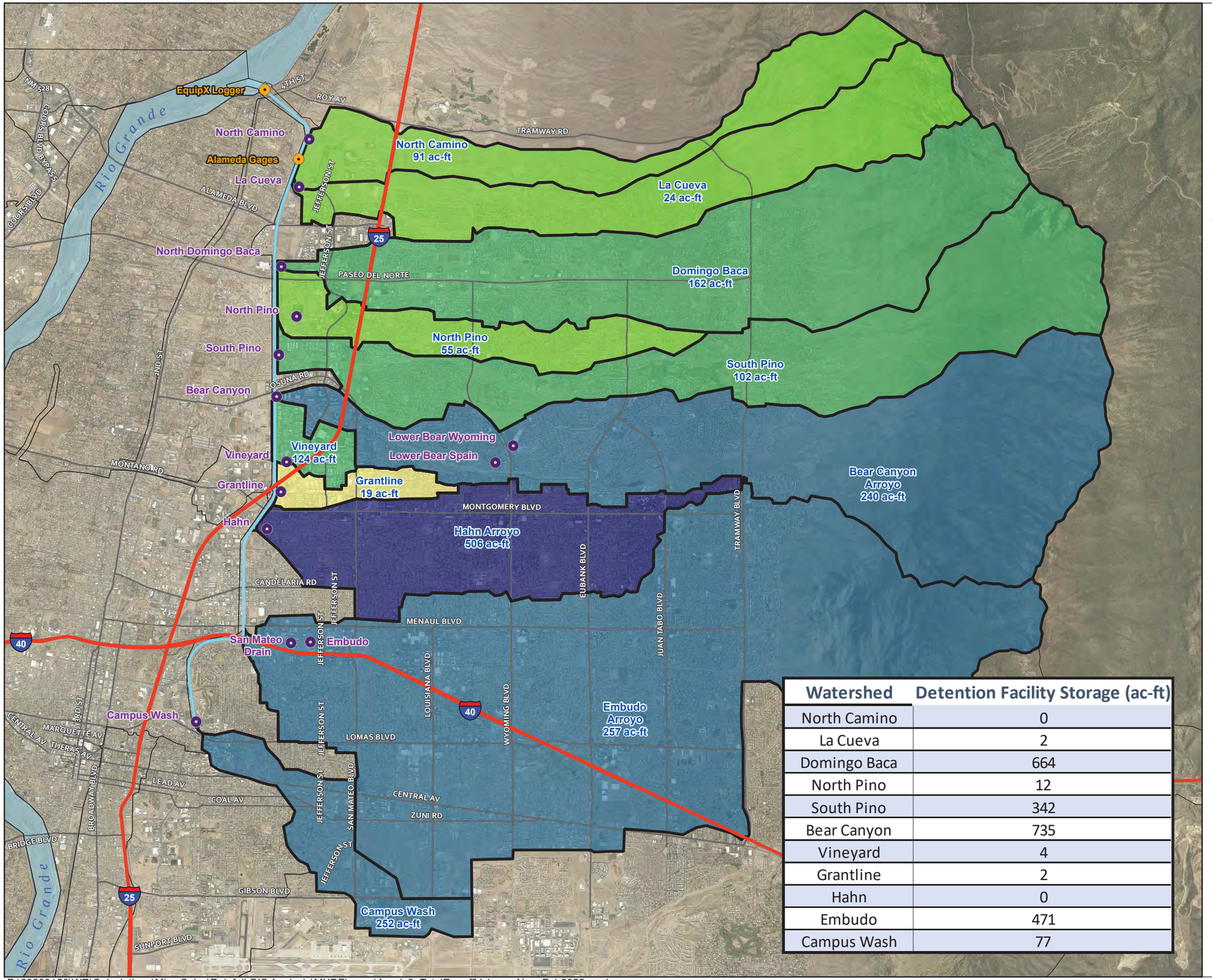
Author: thuynh

Total Runoff Volume (ac-ft)

Measured by Leveloggers per Watershed During Dry Season Months (November - June) From November 2016 - February 2022

Figure 7



Watershed	Detention Facility Storage (ac-ft)
North Camino	0
La Cueva	2
Domingo Baca	664
North Pino	12
South Pino	342
Bear Canyon	735
Vineyard	4
Grantline	2
Hahn	0
Embudo	471
Campus Wash	77

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Total Runoff Volume (ac-ft)

- 0-20
- 21-100
- 101-200
- 201-350
- >350

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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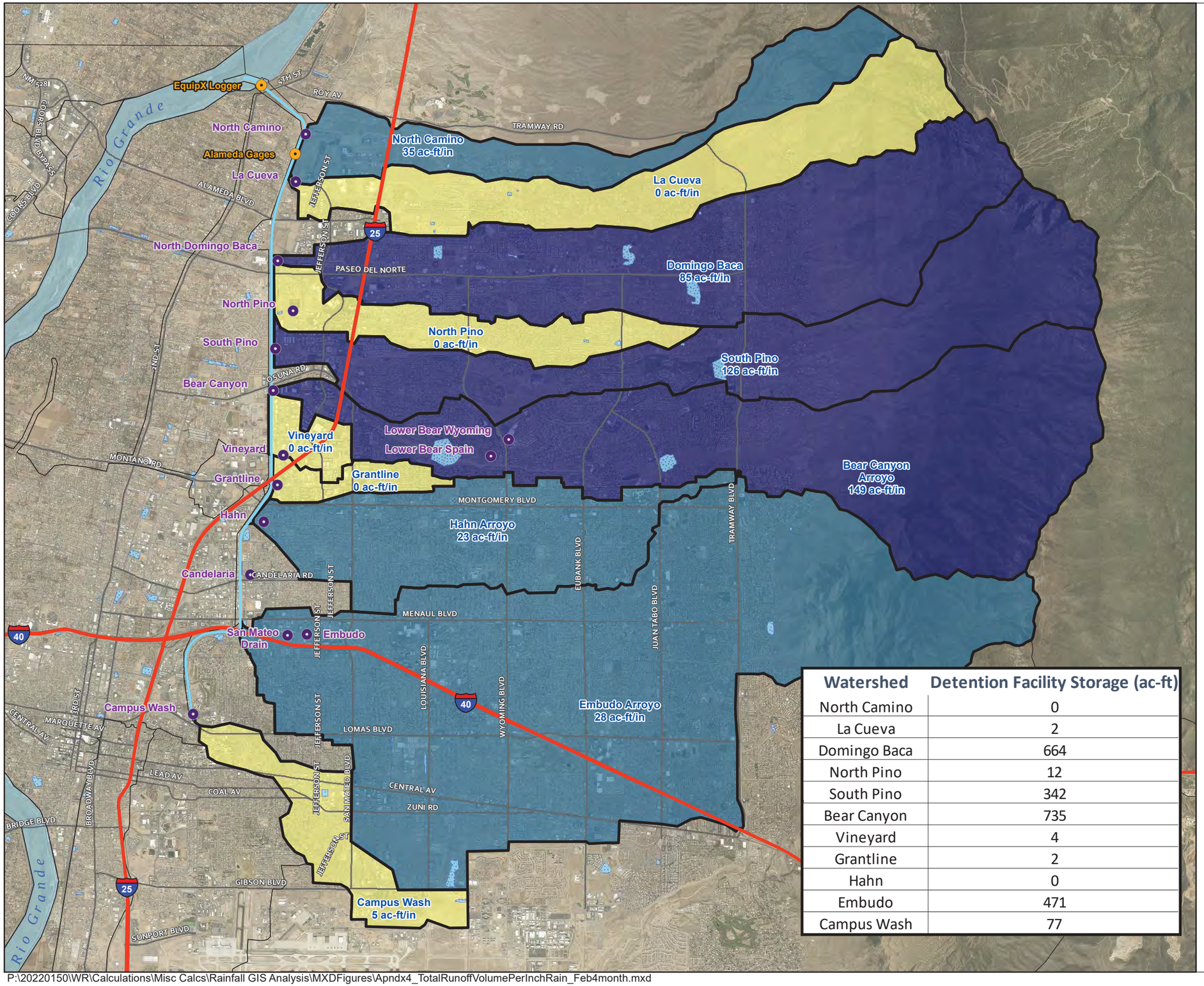
Author: thuynh

Total Runoff Volume per Inch of Rainfall (ac-ft/in Rainfall)

Measured by Leveloggers per Watershed Over 4 Dry Season Months (November 2021 - February 2022)

Figure 8



Watershed	Detention Facility Storage (ac-ft)
North Camino	0
La Cueva	2
Domingo Baca	664
North Pino	12
South Pino	342
Bear Canyon	735
Vineyard	4
Grantline	2
Hahn	0
Embudo	471
Campus Wash	77

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Total Runoff Volume Per Inch Rainfall (ac-ft/in)

- 0 - 5
- 6 - 10
- 11 - 20
- 21 - 40
- > 41

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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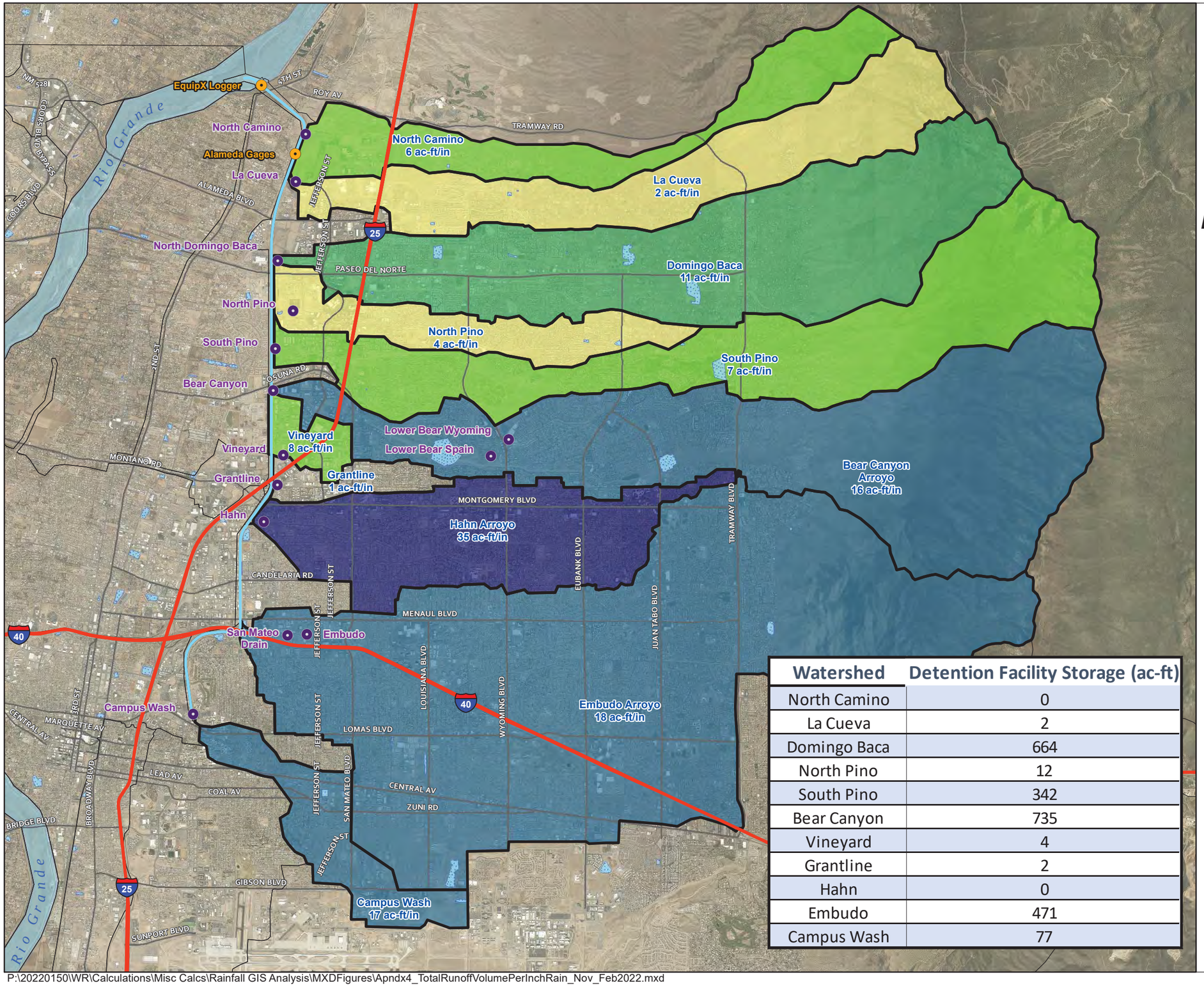
Author: thuynh

Total Runoff Volume per Inch of Rainfall (ac-ft/in Rainfall)

Measured by Leveloggers per Watershed During Dry Season Months (November - June) From November 2016 - February 2022

Figure 9



Watershed	Detention Facility Storage (ac-ft)
North Camino	0
La Cueva	2
Domingo Baca	664
North Pino	12
South Pino	342
Bear Canyon	735
Vineyard	4
Grantline	2
Hahn	0
Embudo	471
Campus Wash	77

- Levelogger Sites
- NDC Levelogger Sites
- North Diversion Channel
- Watersheds

Total Runoff Volume per Inch Rainfall (ac-ft/in)

- 0-5
- 6-10
- 11-15
- 16-25
- >26

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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Author: thuynh

IV. NOVEMBER 2021 COLLECTION PERIOD DATA

One storm event was documented on the CoCoRaHS website during the November collection period for this analysis of the Leveloggers; this occurred on November 23 and 24, 2021. The recorded storm event occurred overnight on November 23 to early morning November 24. For the purpose of this analysis, this storm event is referred to as the November 24, 2021 storm event.

Information for this storm event is presented below and includes CoCoRaHS rainfall data, Levelogger measured peak flow rates and runoff volume data, and a spatially represented map of the CoCoRaHS station point rainfall data using the ArcGIS "kriging" tool as well as peak flows reported for each Levelogger.

Table 3 summarizes the monitored runoff volume and peak flow for the storm event for each Levelogger for the November collection period. The monthly total rainfall for the watersheds for the November collection period, as reported by CoCoRaHS station point rainfall data, is shown in Figure 12.

A. NOVEMBER 24, 2021

On November 24, 2021, a storm event occurred. Table 2 presents the daily CoCoRaHS data for this storm event for all the NDC watersheds with Levelogger sites. The bar chart in Figure 10 graphically shows the recorded Levelogger peak flow rates and runoff volume data for the Levelogger locations. The CoCoRaHS data for this storm event was added into ArcGIS; the data is presented spatially related to the underlying watersheds in Figure 11.

Table 2: November 24, 2021 Storm Event CoCoRaHS Total Precipitation Data

Average CoCoRaHS Rainfall/Snow Melt for NDC Watershed: 0.24 Inches Sunport Rainfall Gage (NOAA): 0.12 Inches		
Watershed	**Range of CoCoRaHS Reported Precipitation Totals (inches)**	**Average of CoCoRaHS Reported Precipitation Data (inches)**
***North Camino Arroyo	--	--
***La Cueva Arroyo	--	--
North Domingo Baca	0.24 to 0.32	0.28
North Pino Arroyo	0.21	0.21
South Pino Arroyo	0.20 to 0.29	0.25
**Bear Canyon Arroyo	0.25 to 0.32	0.29
***Vineyard Arroyo	--	--
***Grantline Arroyo	--	--
Hahn Arroyo	0.20 to 0.27	0.23
*Embudo Arroyo	0.13 to 0.33	0.22
*San Mateo Drain	0.13 to 0.33	0.22
Campus Wash	0.14 to 0.17	0.16
**Lower Bear – Upstream (Wyoming)	0.25 to 0.32	0.29
**Lower Bear – Downstream (Spain)	0.25 to 0.32	0.29

**Embudo and San Mateo share the same watershed as delineated by AMAFCA in GIS.*

***Bear Canyon and the Lower Bear Leveloggers share the same watershed.*

****Grantline, North Camino, La Cueva, and Vineyard basins had no CoCoRaHS reporting stations for this storm event.*

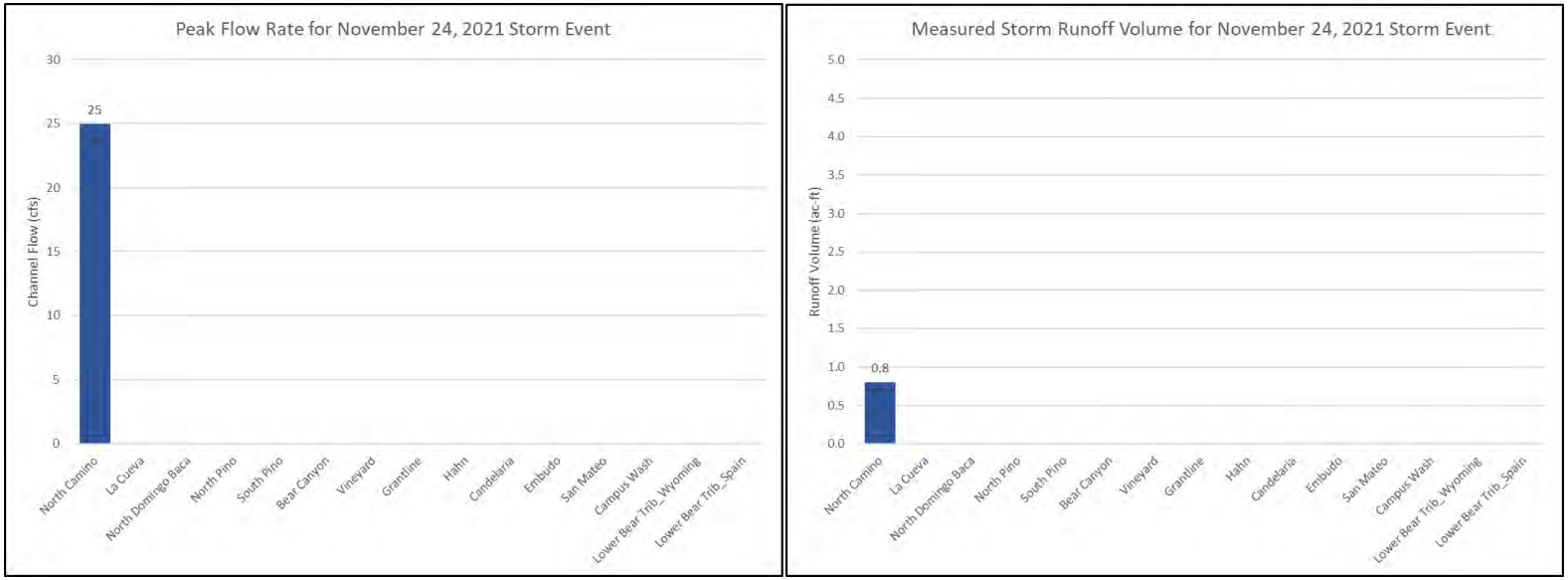

Figure 10: November 24, 2021 Storm Event, Peak Flow Rates and Runoff Volume

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Levelogger Runoff and CoCoRaHS Rainfall November 24, 2021 Storm Event

Figure 11

- ▲ CoCoRaHS Stations with reported rainfall (in)
- North Diversion Channel
- Watersheds

Flow Rate (cfs)	Rainfall (in.)
Not Recorded	0.0 - 0.10
0.1- 25.0	0.11 - 0.20
25.1 - 50.0	0.21 - 0.30
50.1 - 100.0	0.31 - 0.40
100.1- 150.0	0.41 - 0.50
150.1 - 200.0	0.51 - 0.60
200.1 - 500.0	0.61 - 0.70
>500.0	0.71 - 0.80
	0.81 - 0.90
	0.91 - 1.00
	1.01 - 1.10
	1.11 - 1.20
	>1.21

Data Use Liimitation: Precipitation data displayed using Kriging Interpolation Method. Surface should not be used to extract precise location dependent rainfall data outside the immediate area of rainfall guages.

Ave. CoCoRaHS Rainfall for NDC Watershed: 0.24 Inches

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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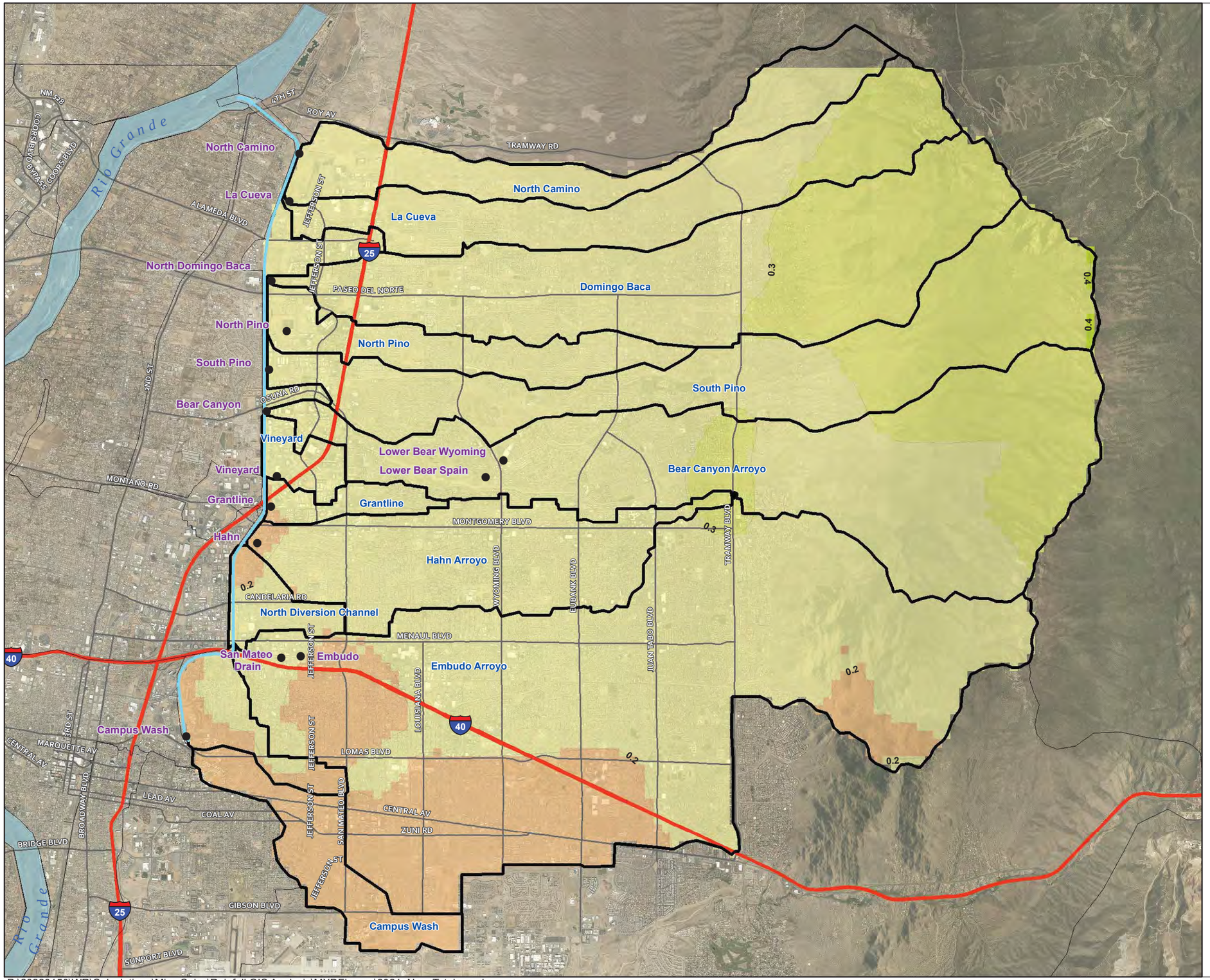
Author: thuynh

Table 3: November 2021 Collection Period Runoff Measured at Levelogger Sites

Storm Event Date: November 24, 2021	
Location	**Runoff Volume (ac-ft)**
North Camino Arroyo	0.8
La Cueva Arroyo	--
North Domingo Baca	--
North Pino Arroyo	--
South Pino Arroyo	--
Bear Canyon Arroyo	--
Vineyard Arroyo	--
Grantline Arroyo	--
Hahn Arroyo	--
Embudo Arroyo	--
San Mateo Drain	--
Campus Wash	--
Lower Bear – Upstream (Wyoming)	--
Lower Bear – Downstream (Spain)	--
Location	**Peak Flow (cfs)**
North Camino Arroyo	25
La Cueva Arroyo	--
North Domingo Baca	--
North Pino Arroyo	--
South Pino Arroyo	--
Bear Canyon Arroyo	--
Vineyard Arroyo	--
Grantline Arroyo	--
Hahn Arroyo	--
Embudo Arroyo	--
San Mateo Drain	--
Campus Wash	--
Lower Bear – Upstream (Wyoming)	--
Lower Bear – Downstream (Spain)	--

CoCoRaHS Rainfall Total November 2021 Collection Period

Figure 12



- Levelogger Sites
- North Diversion Channel
- Watersheds

Rainfall (in.)

0.00 - 0.10	0.71 - 0.80
0.11 - 0.20	0.81 - 0.90
0.21 - 0.30	0.91 - 1.00
0.31 - 0.40	1.01 - 1.10
0.41 - 0.50	1.11 - 1.20
0.51 - 0.60	>1.21
0.61 - 0.70	

*Rainfall recorded for this storm event included both rainfall and snowmelt

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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Author: thuynh

V. DECEMBER 2021 COLLECTION PERIOD DATA

One storm event was documented on the CoCoRaHS website during the December collection period for this analysis of the Leveloggers: December 31, 2021. Very small rain events occurred throughout the month of December, but these were not included in the analysis due to Levelogger data not being distinguishable from daily background noise. The Grantline Levelogger stopped recording data on December 22, 2021.

Information for this storm event is presented below and includes CoCoRaHS rain data, Levelogger measured peak flow rates and runoff volume data, and a spatially represented map of the CoCoRaHS station point rainfall data using the ArcGIS "kriging" tool as well as peak flows reported for each Levelogger.

Table 5 summarizes the monitored runoff volume and peak flow per storm event for each Levelogger for the December collection period. The monthly total rainfall for the watersheds for the December collection period, as reported by CoCoRaHS station point rainfall data, is shown in Figure 15.

A. DECEMBER 31, 2021

On December 31, 2021, a storm event occurred. Table 4 presents the daily CoCoRaHS data for this storm event for all the NDC watersheds with Levelogger sites. The bar chart in Figure 13 graphically shows the recorded Levelogger peak flow rates and runoff volume data for the Levelogger locations. The CoCoRaHS data for this storm event was added into ArcGIS; the data is presented spatially related to the underlying watersheds in Figure 14.

Table 4: December 31, 2021 Storm Event CoCoRaHS Total Precipitation Data

Average CoCoRaHS Rainfall for NDC Watershed: 0.30 inches Sunport Rainfall Gage (NOAA): 0.16 inches		
Watershed	**Range of CoCoRaHS Reported Precipitation Totals (inches)**	**Average of CoCoRaHS Reported Precipitation Data (inches)**
***North Camino Arroyo	--	--
***La Cueva Arroyo	--	--
North Domingo Baca	0.30 to 0.42	0.35
North Pino Arroyo	0.30	0.30
South Pino Arroyo	0.27 to 0.31	0.30
**Bear Canyon Arroyo	0.31 to 0.54	0.43
***Vineyard Arroyo	--	--
***Grantline Arroyo	--	--
Hahn Arroyo	0.26 to 0.32	0.29
*Embudo Arroyo	0.21 to 0.35	0.28
*San Mateo Drain	0.21 to 0.35	0.28
Campus Wash	0.21 to 0.25	0.23
**Lower Bear – Upstream (Wyoming)	0.31 to 0.54	0.43
**Lower Bear – Downstream (Spain)	0.31 to 0.54	0.43

**Embudo and San Mateo share the same watershed as delineated by AMAFCA in GIS.*

***Bear Canyon and the Lower Bear Leveloggers share the same watershed.*

****Grantline, North Camino, Vineyard, and La Cueva basins had no CoCoRaHS reporting stations for this storm event.*

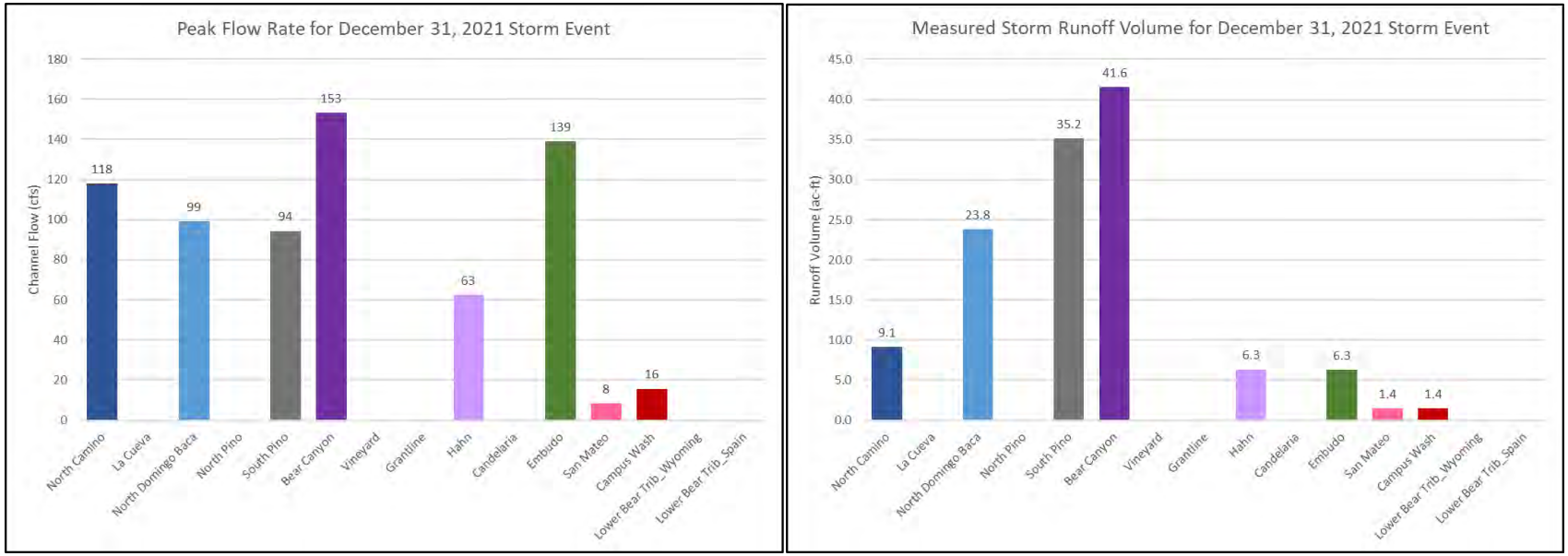

Figure 13: December 31, 2021 Storm Event, Peak Flow Rates and Runoff Volume

AMAFCA
Levelogger Runoff and CoCoRaHS Rainfall
December 31, 2021
Storm Event

Figure 14

▲ CoCoRaHS Stations with reported rainfall (in)

North Diversion Channel

Watersheds

Flow Rate (cfs)	Rainfall (in.)
Not Recorded	0.0 - 0.10
0.1- 25.0	0.11 - 0.20
25.1 - 50.0	0.21 - 0.30
50.1 - 100.0	0.31 - 0.40
100.1- 150.0	0.41 - 0.50
150.1 - 200.0	0.51 - 0.60
200.1 - 500.0	0.61 - 0.70
>500.0	0.71 - 0.80
	0.81 - 0.90
	0.91 - 1.00
	1.01 - 1.10
	1.11 - 1.20
	>1.21

Data Use Liimitation: Precipitation data displayed using Kriging Interpolation Method. Surface should not be used to extract precise location dependent rainfall data outside the immediate area of rainfall guages.

Ave. CoCoRaHS Rainfall for NDC Watershed: 0.30 Inches

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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Author: thuynh

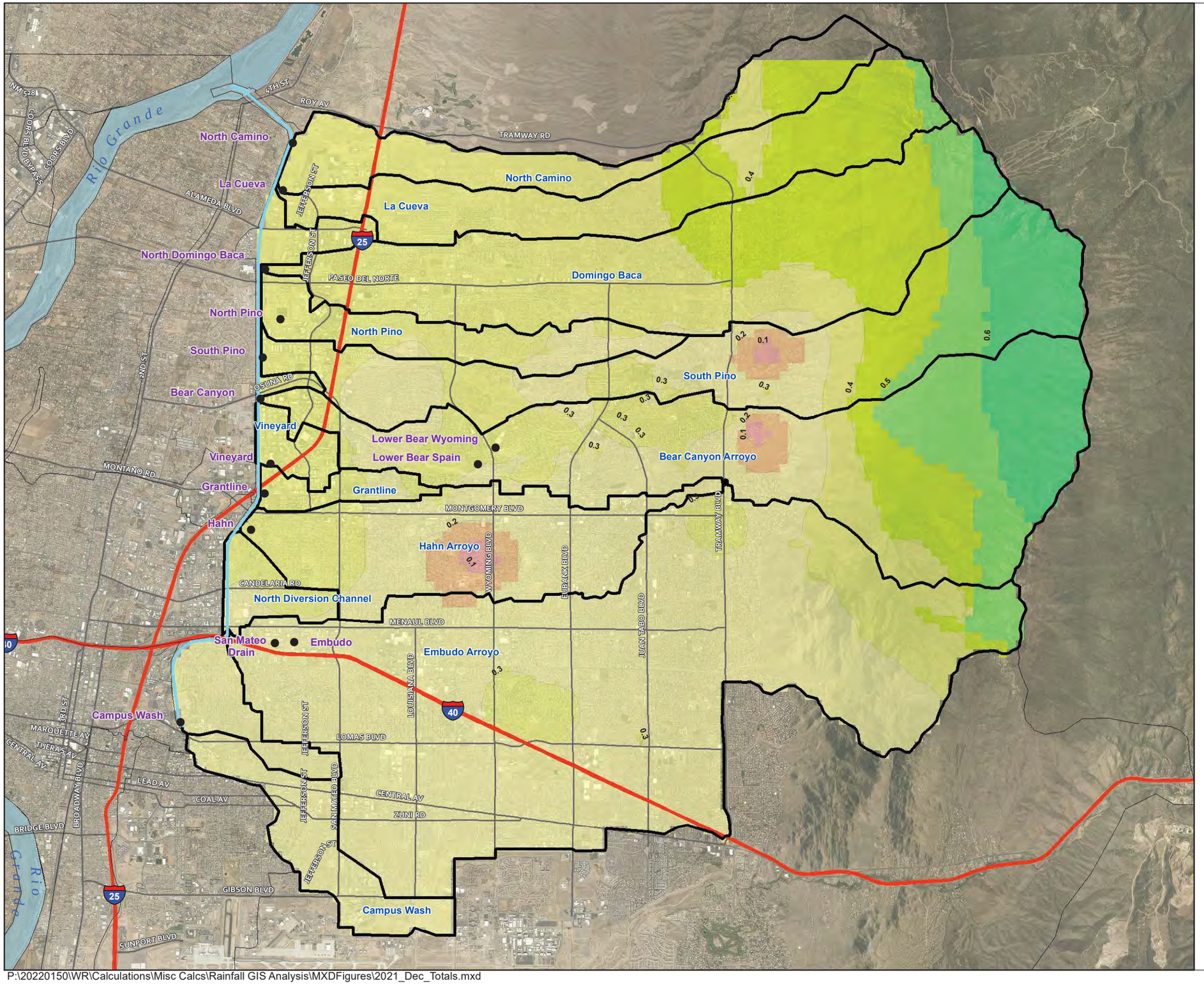
Table 5: December 2021 Collection Period Runoff Measured at Levelogger Sites

Storm Event Date: December 31, 2021	
Location	**Runoff Volume (ac-ft)**
North Camino Arroyo	9.1
La Cueva Arroyo	--
North Domingo Baca	23.8
North Pino Arroyo	--
South Pino Arroyo	35.2
Bear Canyon Arroyo	41.6
Vineyard Arroyo	--
**Grantline Arroyo	--
Hahn Arroyo	6.3
Embudo Arroyo	6.3
San Mateo Drain	1.4
Campus Wash	1.4
Lower Bear – Upstream (Wyoming)	--
Lower Bear – Downstream (Spain)	--
Location	**Peak Flow (cfs)**
North Camino Arroyo	118
La Cueva Arroyo	--
North Domingo Baca	99
North Pino Arroyo	--
South Pino Arroyo	94
Bear Canyon Arroyo	153
Vineyard Arroyo	--
**Grantline Arroyo	--
Hahn Arroyo	63
Embudo Arroyo	139
San Mateo Drain	8
Campus Wash	16
Lower Bear – Upstream (Wyoming)	--
Lower Bear – Downstream (Spain)	--

***Grantline Levelogger stopped recording data on 12/22/2021.*

CoCoRaHS Rainfall Total December 2021 Collection Period

Figure 15



- Levelogger Sites
- North Diversion Channel
- Watersheds

Rainfall (in.)

0.00 - 0.10	0.71 - 0.80
0.11 - 0.20	0.81 - 0.90
0.21 - 0.30	0.91 - 1.00
0.31 - 0.40	1.01 - 1.10
0.41 - 0.50	1.11 - 1.20
0.51 - 0.60	>1.21
0.61 - 0.70	

*Rainfall recorded for this storm event included both rainfall and snowmelt

N

0 6,000 12,000 Feet

1 inch equals 1 mile

AMAFCA

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Author: thuynh

VI. JANUARY 2022 COLLECTION PERIOD DATA

A few small rain/snowstorm events were documented on the CoCoRaHS website during the January collection period for this analysis of the Leveloggers. The data for January was collected on February 3, 2022. AMAFCA manually compensated the Levelogger data during this collection period due to the Barologger being sent out for a diagnostic test. The Levelogger data reported could not be analyzed due to daily background noise of each Levelogger.

VII. FEBRUARY 2022 COLLECTION PERIOD DATA

A few small rain/snowstorm events were documented on the CoCoRaHS website during the February collection period for this analysis of the Leveloggers. The data for February was collected on March 3, 2022. AMAFCA manually compensated the Levelogger data during this collection period due to the Barologger not being deployed. The Levelogger data reported could not be analyzed due to daily background noise of each Levelogger.

VIII. SUMMARY

This is the second Levelogger program report for FY 2022. The first report covered the four-month wet season time frame of July 2021 – October 2021, and the third and last report for FY 2022 will cover the remaining dry season time period from March 2022 – June 2022.

For the four-month dry season period covered in this report, November 2021 – February 2022, two storm events were recorded by the Leveloggers and were analyzed in this report. During this reporting period, there were no illicit discharge indicators detected during the AMAFCA site visits. One storm event occurred on November 23-24, 2021, with a total rainfall of 0.24-inches within the NDC watershed. The Leveloggers recorded runoff at only one location. The low runoff was likely due to 1) the storm was a low intensity, longer duration storm event than is typical for Albuquerque storms and 2) the existing conditions within the city were very dry - the last prior rainfall to this storm event occurred on October 26, 2021, 28 days prior to this storm event. These conditions likely allowed more infiltration and resulted in less runoff within the watershed for the November storm event. The second storm event for this reporting period occurred on December 31, 2021, with a total rainfall of 0.3-inches within the NDC watershed. The Leveloggers recorded runoff at eight locations.