NIGHTGLOW AVENUE FLOOD RISK REDUCTION

ALTERNATIVE ANALYSIS REPORT

SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY

PN: MO_P0020

Smith Engineering Company
2201 San Pedro Drive NE,
Building 4, Suite 200
Albuquerque, NM 87110
505-884-0700
www.smithengineering.pro

May 2023
Rev.
Smith Project No.: 123103

NIGHTGLOW AVENUE FLOOD RISK REDUCTION

ALTERNATIVE ANALYSIS REPORT

SSCAFCA

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice in the state of New Mexico, is affixed below.

Engineer's Seal & Signature

Jesus Lopez, NMPE 26361

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

The Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) has hired Smith Engineering Company (Smith) to provide an Alternative Analysis Report (AAR) for the conceptual design of Nightglow Avenue Flood Risk Reduction Project. The project area is within the Montoyas Arroyo Watershed in parts of Sandoval County and Rio Rancho, New Mexico.

The goal of this report is to provide SSCAFCA with a design recommendation to alleviate the potential for flooding in the vicinity of Nightglow Avenue. The following items will be completed as part of the study:

- Update the SSCAFCA HEC-HMS model using the SSCAFCA Hydrology Manual, v1.1 (March 2021) hydrology procedures and design criteria for the subbasins contributing to the project site (Basin G_201).
- Model the Existing Conditions and Ultimate Conditions using the 10-year, 50-year, 100-year, and 500-year 24-hour design storm. Infrastructure will be sized based on the 100-year design storm in existing conditions.
- Inventory of existing infrastructure within the project area.
- Develop alternatives that meet the scope of project and prepare a recommendation for design.
- Determine Right-of-Way (ROW) acquisition requirements for each alternative.
- Prepare Engineer's Opinion of Probable Construction Costs (EOPC) with a 30% contingency.

BACKGROUND

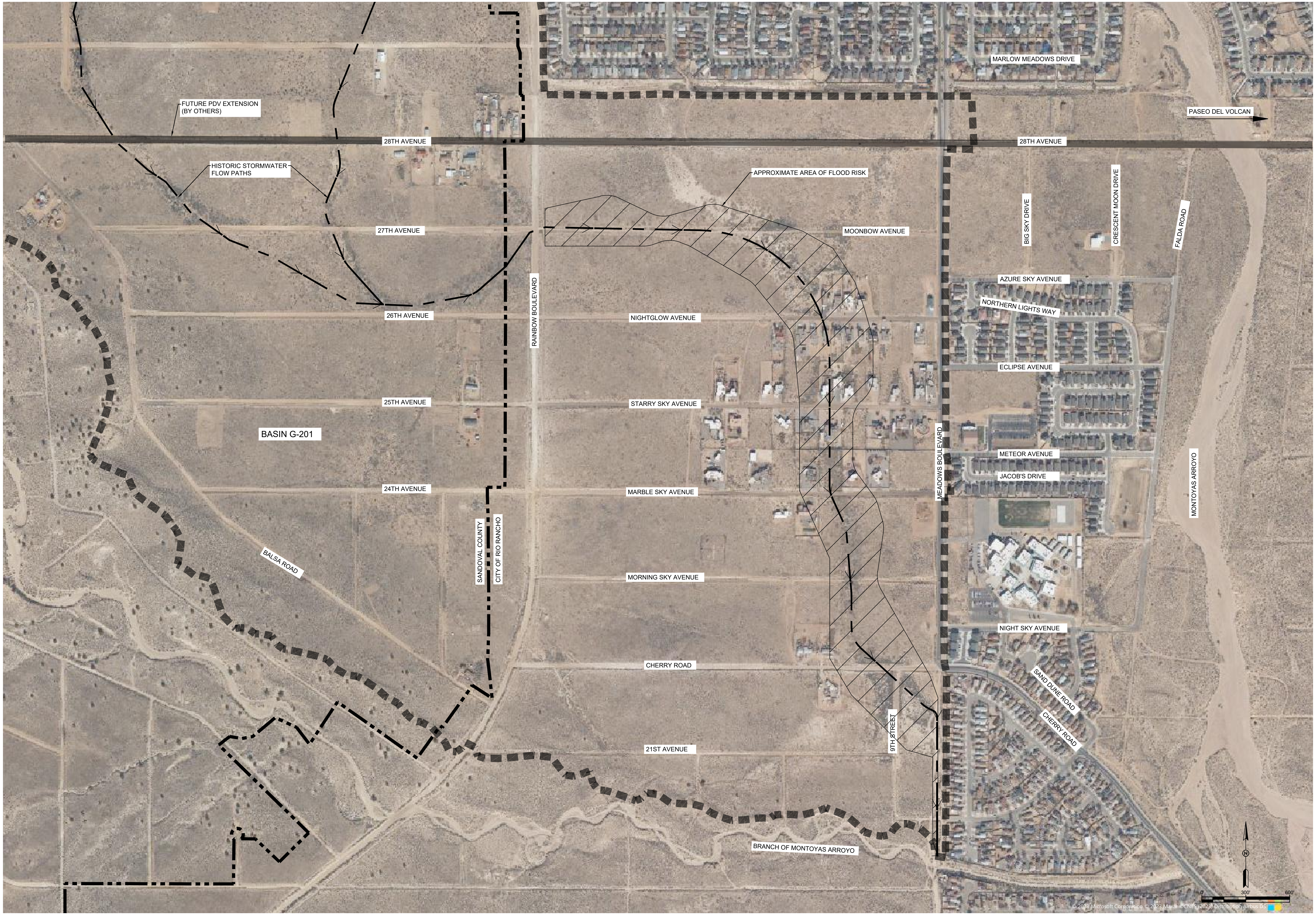
The Montoyas Watershed Park is a 61 square mile drainage basin found in southern Sandoval County. The arroyo is a tributary to the Rio Grande and conveys approximately 8,398 CFS of stormwater runoff just upstream of the project location during the 100-year 24-hour storm event. Within this watershed is Basin G_201, identified in the SSCAFCA HEC-HMS Model, that is the basin contributing storm water flows to the project area.

The project area is located in the southeast quadrant of the 28th Avenue and Rainbow Boulevard intersection, stretching several blocks to the southeast and east to the Montoyas Arroyo. 28th Avenue is the western extension of Paseo del Volcan. The project area east of and including Rainbow Boulevard is within the City of Rio Rancho. The project area west of Rainbow Boulevard is outside of city limits and within Sandoval County. The entire project area is within SSCAFCA jurisdiction. Sandoval County is working on the extension of Paseo del Volcan which will cross the stormwater flows within the project basin. For purposes of this report, Smith assumes that the roadway extension will consider the existing stormwater flows and will provide a design to convey the 100-year 24-hour design flows to continue down the historic path.

The project area is not within a FEMA Floodplain. However, a study was completed in 2021 by SSCAFCA that identified the project area could be subjected to flooding during the 100-year storm event. SSCAFCA determined the extents of potential flooding using HEC-RAS to perform hydraulic modeling and delineating the 0.5-ft flood depth extents which are conveyed through existing residences. The extents potential flooding became the general project area which is analyzed in this study. There is no existing stormwater infrastructure in place to convey the flows within Basin G_201.

A majority of the flows within Basin G_201 surface drain through undeveloped land towards the project area which inundates portions of Nightglow Avenue and existing residential homes. The uncontrolled flow continues south to

the eventual discharge location at Meadows Boulevard and a branch of the Montoyas Arroyo approximately 1,750 feet west of the Montoyas Arroyo. A flood mitigation facility is proposed near the site; however, the facility is proposed downstream of the project area near the Montoyas Arroyo branch and Meadows Boulevard, which will not aid in the flood mitigation of the project area. Figure 1 depicts the project area in existing conditions at the time of this report, as well as the Paseo del Volcan roadway extension.



SSCAFCA
RIO RANCHO, NEW MEXICO 87124

NO	REVISION DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SSCAFCA
NIGHTGLOW AVENUE FLOOD RISK REDUCTION

FIGURE 1:
VICINITY MAP

Solutions for Today...
Vision for Tomorrow

SMITH ENGINEERING
401 N Pennsylvania
Roswell, NM 88201
Phone: 575-622-8866
www.smithengineering.pro

JOB NO: 123103
DATE: MAY 2023
SHEET NO: 3

PREVIOUS STUDIES

Two previous studies have analyzed the Montoyas Arroyo Watershed: the Base Level Engineering for Southern Sandoval County Arroyo Flood Control Authority (BLE) (ESP Associates, Inc., 2019) and the Montoyas Watershed Park Management Plan (MWP) (SSCAFCA, 2021).

The BLE report provided hydrologic and hydraulic analyses for all watersheds within SSCAFCA's jurisdiction and modeled the 10-, 25-, 50-, 100-, and 500-year storm events using LiDAR data. A two-dimensional hydraulic model was prepared to estimate flood elevations for areas within the watersheds.

The MWP expanded further on the Montoyas Watershed to document future improvements for flood mitigation within the watershed boundaries. The MWP updated the SSCAFCA HEC-HMS model which includes the basins used as the basis of design for this AAR.

FEMA Firm Panel 35043C1900D revised March 2008 designates the project area as Zone X, outside of a special flood hazard area. The Montoyas Arroyo is designated Zone A. The FEMA Firm Panel can be found in Appendix E.

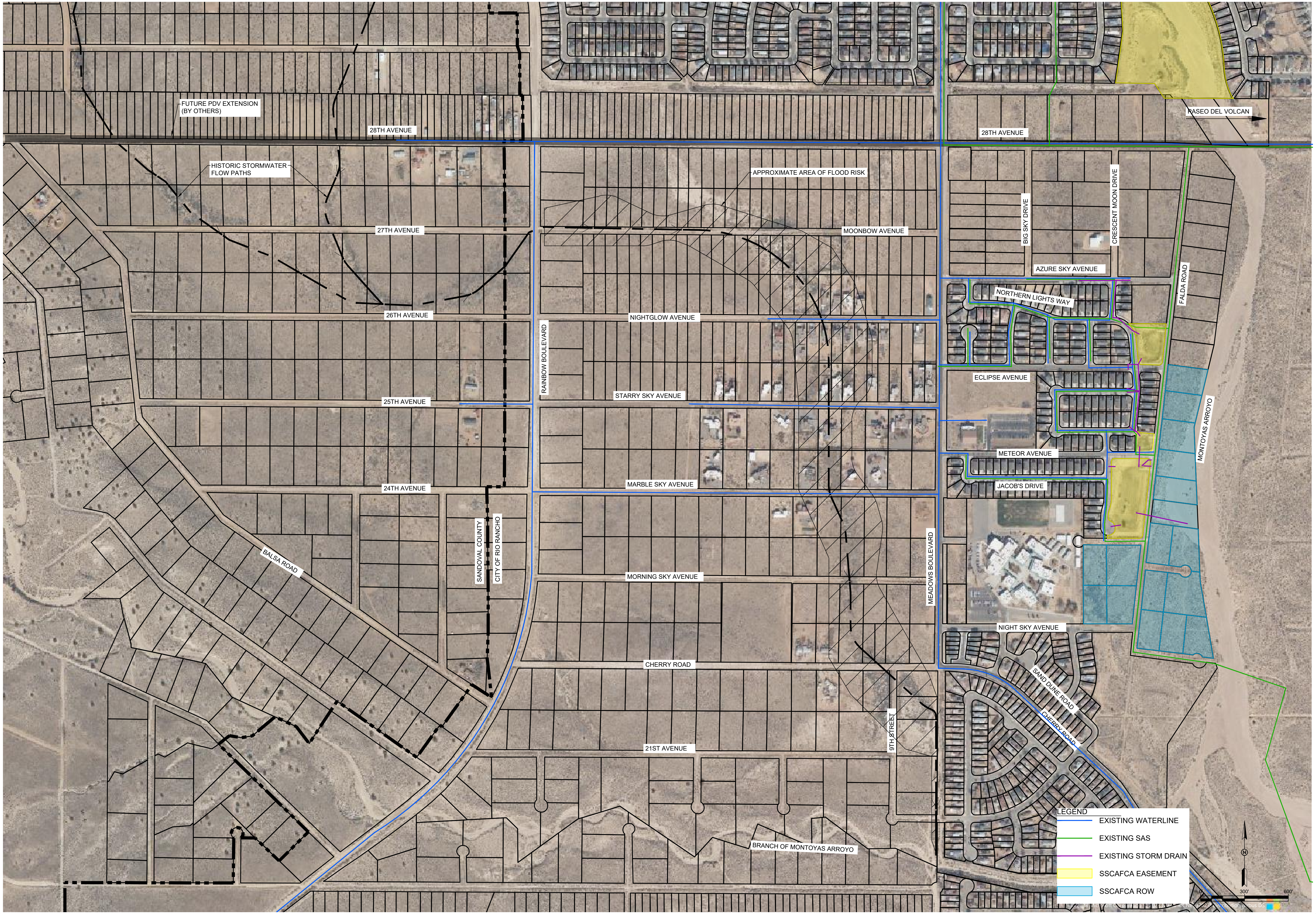
EXISTING CONDITIONS

The project area is mostly undeveloped 0.5 and 1-acre residential lots with approximately 50 developed residences spanning east-west from Meadows Boulevard to Rainbow Boulevard and north-south from 28th Avenue to Cherry Road. The project site and surrounding area consists of moderate native vegetation (bushes and shrubs) with erodible soils as noted by the large amounts of sediment deposition throughout project area. The roadway system consists of bladed dirt roads which currently have sediment deposits and are in need of drainage design and maintenance. Few roadway drainage swales were observed throughout the site which had stormwater capacities that appeared insufficient.

Further upstream within the basin, the vegetative cover increases and includes bushes, shrubs, and trees. Based on field observations, the soil types appear similar to the downstream project area, and sediment deposition is commonly observed. The roads in this area are also bladed dirt roads and are in poor condition. The few roadway swales observed in this area also appear to have a negligible impact on stormwater conveyance.

In general, the subbasin slopes from northwest to southeast at an estimated slope of 2% extending approximately one mile northwest of the project site. The flows are estimated to sheet flow at the upper end of the subbasin for approximately 300 feet prior to concentration in a shallow, native vegetative flow path for approximately 2,000 feet. A secondary flow path situated between the primary flow path and Rainbow Boulevard conveys additional flows south. At the lower end of the basin, the flows become channelized as they head south crossing 28th Avenue. These flow paths are well-defined with sandy-bottoms and minimal vegetation. The two channels combine south of 27th Avenue. A berm along the north side of 26th Avenue prevents the flows from crossing south and diverts flows to the east towards Rainbow Boulevard. Once flow crosses Rainbow Boulevard it enters the project area and diverts east along Moonbow Avenue. A natural low point midway between Rainbow Boulevard and Meadows Boulevard diverts the flows south through the existing residences until they reach a branch of the Montoyas Arroyo and Meadows Boulevard. The flows are then conveyed east 1,900 feet through this tributary until they reach the arroyo. Photographs from a site visit can be found in Appendix A.

As discussed previously, the project area roadway system consists of bladed dirt roads and roadway swales which have been observed to have insufficient capacity for the calculated stormwater flows at the site. No other stormwater infrastructure exists at the project area to aid in the mitigation of flows. A stormwater infrastructure system exists downstream of the project area, with a series of SSCAFCA-owned pond facilities in place along the west side of Falda Road. The storm drains vary from 24-inch to 42-inch and have one eventual 30-inch outfall into the arroyo near Nebula Court. Water lines and sanitary sewer lines of various sizes exist throughout the project site and were identified through the City of Rio Rancho's as-built data. Additional lines such as electrical, communications, gas, and cable are known to exist but were not identified in this report. Figure 2 depicts the existing infrastructure within the project area that has been identified by this report.



SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY

SSCAFCA
RIO RANCHO, NEW MEXICO 87124

NO.	REVISION DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SSCAFCA
NIGHTGLOW AVENUE FLOOD RISK REDUCTION

FIGURE 2:
EXISTING INFRASTRUCTURE

Solutions for Today...
Vision for Tomorrow

SMITH ENGINEERING

401 N Pennsylvania
Roswell, NM 88201
Phone: 575-622-8866
www.smithengineering.pro

JOB NO:
123103

DATE:
MAY 2023

SHEET NO:
6

NEED FOR PROJECT

The BLE Report provided a hydraulic analysis using HEC-RAS which identified that during the 100-year storm event, the project area would be flooded with the flows from the upstream portion of the basin. The MWP expanded on this analysis and provided an inundation map showing the areas with depths greater than 0.5 ft resulting from the 100-year storm event. The analysis determined that this is a potential at-risk area with no drainage infrastructure and therefore a detailed study and analysis for flood mitigation is recommended. The figure below was provided in the MWP depicting the flooding limits discussed previously.

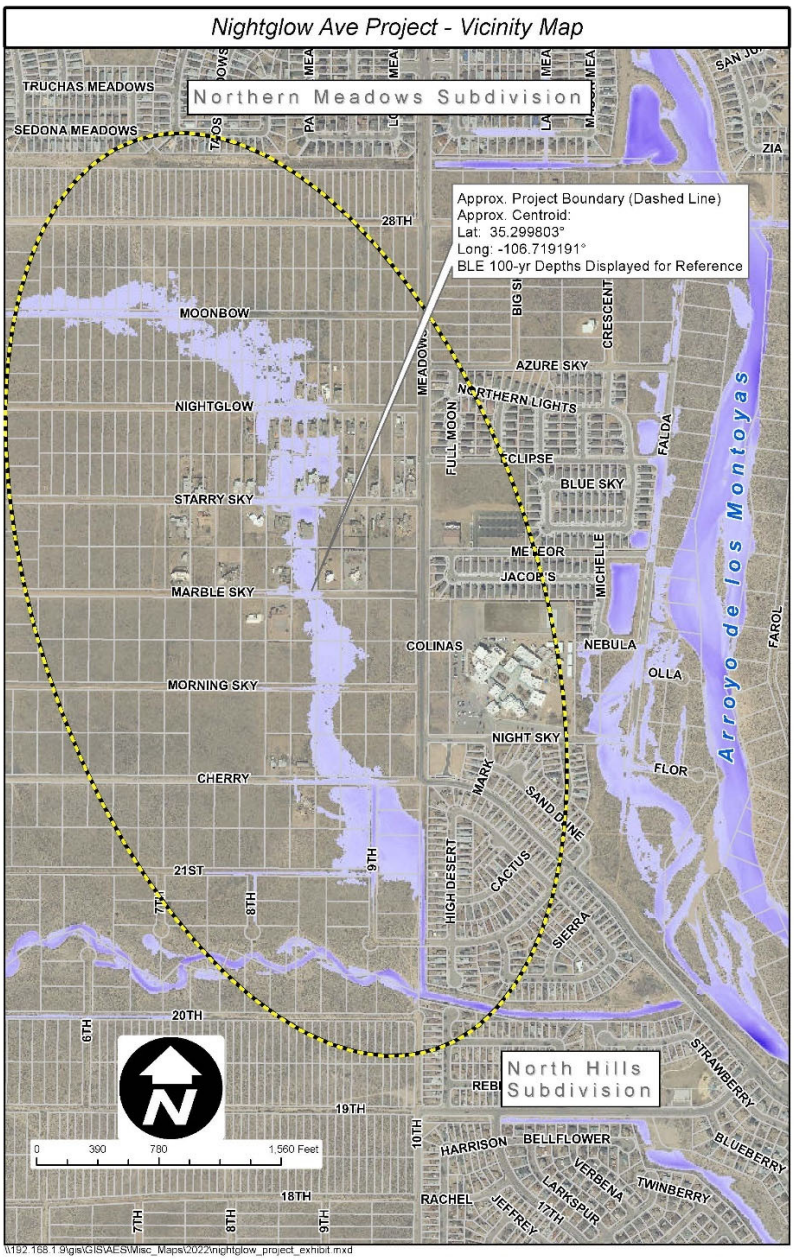


Figure 3: MWP: Nightglow Ave Project Vicinity Map

As noted in Figure 3, the existing residences are already subject to potential flooding during the 100-year design storm. This area may experience rapid growth in the future as seen in the adjacent subdivision developments, which would put additional residences at risk of flooding. It is important to provide a controlled conveyance for the stormwater through the neighborhood to the eventual downstream outfall in a safe manner to protect the existing and future residential development in the area. For this reason, this report will analyze the project area's current conditions, explore alternatives for stormwater mitigation, and provide a recommended solution to safely convey the stormwater.

DESIGN CRITERIA

Hydrology calculations for this report were performed in accordance with the SSCAFCA Hydrology Manual v1.1, March 2021. As part of this report, the 10-, 50-, 100-, and 500-year 24-hour storms were analyzed, and all proposed infrastructure was sized using the 100-year storm event. The 100-year 24-hour rainfall data was unaltered from the SSCAFCA HMS model. Rainfall data for the additional storm events were obtained from NOAA Atlas 14, Volume 1, Version 5. The 100-year 24-hour storm event under existing conditions was used to analyze stormwater flows and calculate hydraulic requirements for the proposed alternatives. The other storm events and ultimate conditions were used to analyze stormwater flows only. Per the MWP, the projected future land use for the basin is future residential with 60% development. This was used as the assumption along with paved roadways for developed ultimate conditions. The DEV_EX conditions within the SSCAFCA HMS model were not analyzed. The bullet list below summarized the general criteria for hydrology design:

- HEC-HMS software is used for rain-fall runoff modeling.
- Curve Number Methodology is used for rainfall loss.
- 100-year 24-hour design storm is used for flood control design.
- Existing Conditions are used as basis of design.
- 10-, 50-, 100-, and 500-year storm event modeled for analysis.
- No depth-area reduction factor to be used in modeling basin for this project.

Two-dimensional hydraulic models in this report were performed using HEC-RAS. Flow hydrograph boundary conditions were used at the upstream areas for modeling of stormwater discharges through the project basin. The following lists the general criteria for hydraulic modeling:

- HEC-RAS software used for hydraulic modeling.
- 2018 LiDAR data used to generate surface
- HEC-HMS 100-year flows obtained from hydrology modeling used as boundary conditions for hydraulic modeling.
- 10-, 50-, 100-, and 500-year storm event modeled for depth analysis.
- Manning's "n" values used based on BLE report and verified with the SSCAFCA Hydrology Manual.

Additional hydraulic calculations were performed using various software explained in the ensuing sections. Design of proposed improvements was performed in accordance with the SSCAFCA Hydrology Manual in conjunction with the City of Rio Rancho Development Process Manual (DPM). The following general design criteria was following based on the DPM:

- Closed Conduit Design

- The HGL shall not be higher than the ground or street surface without design of pressure manholes.
- For conduits discharging into an open channel, the control is the 100-year design water surface elevation of the channel.
- For conduits discharging into another conduit, the control is the design HGL elevation of the outlet conduit immediately upstream of the confluence.
- Manhole maximum spacing at 500 feet.
- Minimum slope for conduit to be 0.3%, minimum flow velocity for ¼ full pipe to be 2 feet per second.

- Open Channel Design
  - Unlined channels to be considered trapezoidal for calculations.
  - Freeboard to be calculated using the DPM Chapter II.2 Section 3.C
  - In general, maximum side slopes for unlined channels to be 6:1
- Pond Design
  - Facility Access roads to be minimum 12 feet wide with maximum 10:1 slopes.
  - Principal spillways to be designed for the 100-year flows.
  - Emergency spillways to be designed for the 500-year flows.
  - Pond to have a minimum of 1 foot of freeboard.

METHODOLOGY

HYDROLOGY

The U.S. Army Corps of Engineers HEC-HMS Version 4.2.1 was used for hydrologic analysis of the project area. SSCAFCA provided a HEC-HMS model for the Montoyas Arroyo Watershed which was updated and used for analysis of existing conditions. This assumes the project area is at its current state without any additional development in the surrounding area nor improvements for stormwater runoff mitigation. The existing conditions were used as a basis of design for this report, and the ultimate conditions were modeled for informational purposes but are not used for design recommendations.

Table 1 summarizes the hydrologic input parameters for the model. Ensuing sections of this report explain how the values for these inputs were developed.

Summary of Hydrology Input Parameters										
	Existing Conditions					Ultimate Conditions				
Subbasin	Area (ac)	CN	Imp. Area (%)	Tc (min)	Lag Time (min)	Area (ac)	CN	Imp. Area (%)	Tc (min)	Lag Time (min)
G_201A	461.2	75	0.2%	75	45.3	461.2	73	8.3%	41	24.8
G_201B	3.9	82	0.0%	24	14.6	3.9	70	32.9%	18	10.8
G_201C	98.1	75	0.7%	30	17.9	98.1	72	10.8%	19	11.6
G_201D	375.8	75	0.4%	51	30.5	375.8	75	6.6%	34	20.4

Table 1: Summary of Hydrology Input Parameters

RAINFALL DATA

The MWP used the HEC-HMS built-in frequency storm with an intensity position of 25% (6-hour) and a depth-area reduction for the watershed area of 61 square miles. The rainfall data was obtained from NOAA Atlas 14. The frequency storm, intensity, and 100-year rainfall data were unchanged in this project's updated modeling. Additional rainfall data was obtained from NOAA Atlas 14 for the 10-, 50-, and 500-year storm events. Per the SSCAFCA Hydrology Manual, the depth-area reduction should only be used for basins larger than 10 square miles, otherwise the modeled flow rates may be underestimated. Basin G_201 is approximately 1.5 square miles, so this update includes no depth-area reduction. The difference in flow rates result in an approximate 37% increase. For comparison, Basin G_201 flow rates with and without the reduction factor resulted in 278 and 380 CFS, respectively. The table below depicts the precipitation estimates used in the model.

Partial-Duration Depth (inches)				
	Design Storm Event (year)			
Duration	**10**	**50**	**100**	**500**
5 Minutes	0.374	0.522	0.589	0.758
15 Minutes	0.706	0.986	1.11	1.43
1 Hour	1.18	1.64	1.85	2.39
2 Hours	1.34	1.89	2.13	2.79
3 Hours	1.4	1.95	2.2	2.88
6 Hours	1.56	2.13	2.39	3.05
12 Hours	1.72	2.31	2.55	3.22
24 Hours	1.97	2.63	2.9	3.66
*Depths for the 10-, 50-, and 500-year storm event were obtained from NOAA Atlas 14 at time of AAR preparation				
*Depths for the 100-year storm event were unaltered from the SSCAFCA HEC-HMS model.				

Table 2: Precipitation Depth

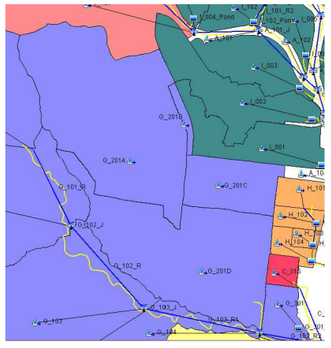
SUBBASIN DELINEATION

The subbasin boundaries for the Montoyas Watershed were initially delineated as part of the MWP using HEC Geo-HMS software with digital elevation model (DEM) created from 2010 MRCOG LiDAR data and digital orthophotography from 2018.

Smith reviewed Basin G_201 boundaries with updated mapping from 2018 MRCOG LiDAR and aerial mapping. Smith also conducted a site visit to observe the entirety of Basin G_201's boundary and agrees with the original boundary from the MWP therefore no changes were needed.

To analyze the extents of stormwater flows to the specific project area, Basin G_201 was divided into smaller subbasins. Basin G_201A is the main contributing basin to the project site. Basin G_201B is diverted away from the project area with via a high point in the roadway and is conveyed through the existing South Channel of the Northern Meadows Subdivision. Basin G_201C adds flows on the north side of the project area and does not combine with Basin G_201A upstream of the project area. Basin G_201D is downstream of the project site and does not affect the flood risk area. Figure 4 depicts the subbasin boundaries.

HEC HMS Results Summary				
Existing Conditions				
	G_201A	G_201B	G_201C	G_201D
Q10	77.2	2.7	29.3	82.5
V10	16.4	0.2	3.6	13.6
Q50	186.6	5.5	72.9	200.5
V50	32.5	0.4	7.1	26.8
Q100	243.2	6.8	95.3	261.7
V100	40.1	0.5	8.7	33.0
Q500	418.2	10.5	163.7	448.7
V500	63.4	0.7	13.7	52.1
Ultimate Conditions				
	G_201A	G_201B	G_201C	G_201D
Q10	134.4	3.7	43.0	133.1
V10	18.9	0.3	4.2	16.4
Q50	286.4	6.1	91.6	284.5
V50	34.3	0.4	7.4	29.7
Q100	365.5	7.2	117.3	363.2
V100	41.4	0.5	8.9	35.8
Q500	609.6	10.7	196.3	601.5
V500	63.3	0.7	13.6	54.5



HEC-HMS DIAGRAM

1. EXISTING SUBBASINS PER THE MONTOYAS WATERSHED PARK MANAGEMENT PLAN (SSCAFCA, 2021).
2. SUBBASINS G_201A - G_201D HAVE BEEN REDEFINED DURING THIS STUDY. ALL OTHER SUBBASINS ARE NOT PART OF THIS STUDY.

I_003
I_002
NORTHERN MEADOWS SUBDIVSION
A_104
I_001
"SOUTH CHANNEL"
28TH AVE
G_201C
MOONBOW AVE
H_101
FALDA RD
NIGHTGLOW AVE
H_102
CIELO NORTE SUBDIVISION
H_103
H_104
G_201D
C_015
MONTOYAS ARROYO
A_105
RAINBOW BLVD
NORTH HILLS SUBDIVISION
G_301
G_104
G_103
G_102
G_101
G_201B
G_201A

0 500' 1000'

SSCAFCA
RIO RANCHO, NEW MEXICO 87124

NO	REVISION DESCRIPTION	DATE	BY
5			
4			
3			
2			
1			

SSCAFCA
NIGHTGLOW AVENUE FLOOD RISK REDUCTION

FIGURE 4:
SUBBASIN MAP

Solutions for Today... Vision for Tomorrow

401 N Pennsylvania
Roswell, NM 88201
Phone: 575-622-8866
www.smithengineering.pro

SMITH ENGINEERING

JOB NO: 123103
DATE: MAY 2023
SHEET NO: 11

Q:\SEC--4\PROJECTS\123103\CADD\PLANSET\EXHIBITS\SUBBASIN MAP.dwg May 03, 2023 - 1:38pm Saved By: jesusl

LAND TREATMENT

The SSCAFCA Hydrology Manual recommends the SCS Curve Number Method to calculate the rainfall loss, with a composite curve number established to represent runoff more accurately.

Table 1 from the SSCAFCA Hydrology Manual provides reasonable values for directly connected (DCIA) and unconnected impervious areas (UIA). These values can be adjusted based on site-specific conditions. Table 3 below depicts the assumptions used for DCIA and UIA.

DCIA/UIA Assumptions			
Land Use Type	**Assumption**	**DCIA**	**UIA**
Residential Roof	2,000 SF	50%	50%
Backyard Imp.	2% of lot area	0%	100%
Residential Drive	480 SF	100%	0%
Paved Road	24 ft width	100%	0%
Sidewalk	6 ft width	0%	100%
Rural Road	24 ft width	0%	100%

Table 3: DCIA/UIA Assumptions

The curve numbers were estimated using Tables 2 and 3 of the SSCAFCA Hydrology Manual which provide curve number selection guidelines based on land use and open space / undisturbed ground coverage. The general ground cover was found to be in the 30-70% range within the "Loamy Sand" NRCS field guide resulting in a curve number of 74 for open space. The following equation was then used to calculate a composite curve number:

$$CN_{comp} = \frac{area\ of\ land\ \ use\ type\ 1}{total\ subbasin\ area - DCIA} * CN_1 + \frac{area\ of\ land\ \ use\ type\ 2}{total\ subbasin\ area - DCIA} * CN_2 + \cdots$$

- CN_{comp} = composite curve number
- CN_x = curve number of a type of land use
- DCIA = directly connected impervious area

Under existing conditions, the land uses include residential lots, graded/compacted areas, open space (natural areas undisturbed), and unpaved roads (graded dirt roads) approximately 24' in width. Under ultimate conditions, the land uses include the same as the existing conditions with the addition of impervious areas for paved roads. The paved roads were assumed to be 24' in width with no curb and gutter nor sidewalk. Along Paseo del Volcan, the assumption made was a 4-way paved road with curb and gutter and sidewalks. In general, the subbasin assumptions from the SSCAFCA HEC-HMS model were held for ultimate conditions which predicts approximately 60% of the residential area to be developed. The following tables depict the calculated composite curve numbers and impervious areas for both the existing and ultimate conditions.

Composite Curve Numbers: Existing Conditions			
Basin	**Area (ac)**	**Composite CN**	**% Impervious**
G_201A	461.2	75	0.2%
G_201B	3.9	82	0.0%
G_201C	98.1	75	0.7%
G_201D	375.8	75	0.4%

Table 4: Composite Curve Numbers: Existing Conditions

Composite Curve Numbers: Ultimate Conditions			
Basin	**Area (ac)**	**Composite CN**	**% Impervious**
G_201A	461.2	73	8.3%
G_201B	3.9	58	32.9%
G_201C	98.1	72	10.8%
G_201D	375.8	75	6.6%

Table 5: Composite Curve Numbers: Ultimate Conditions

TRANSFORM

The SCS Unit Hydrograph is the recommended transform method per the SSCAFCA Hydrology Manual. The SSCAFCA HEC-HMS model was updated from the Clark Unit Hydrograph to the SCS Unit Hydrograph used with the Standard (PRF 484) Graph Type. The time of concentration (T_c) was calculated based on the velocity method of the National Engineering Handbook Chapter 15 (USDA 2010) and a subsequent Lag Time (T_{LAG}) was calculated by taking 60% of the T_c. Calculations for transform parameters can be found in Appendix B.

SEDIMENT BULKING

The HEC-HMS models simulate clear water hydrographs unless a "Flow Ratio" is applied to simulate sediment volume within hydrographs. This parameter is called sediment bulking. A sediment bulking value of 18% was selected for existing conditions and a sediment bulking of 12% was selected for the ultimate flow conditions, with the assumption that development will remain rural with no improved paved roads or curb and gutter. The lower and upper limits for sediment bulking per the SSCAFCA Hydrology Manual are 6% for urbanized areas and 18% for open space, respectively.

RESULTS

During the 100-year 24-hour design storm event, the main contributor to the flooding issues in the project area, Basin G_201A, generates a flow rate of 243 CFS. Basin G_201B does not affect the project site and is conveyed away from the project site. Basin G_201C generates 95 CFS which will also need to be accounted for in the development of proposed solutions for the area. Basin G_201D is downstream of the project area and does not contribute to the flooding issues. The table below demonstrates the basin hydrology and model results.

HEC HMS Results Summary				
Existing Conditions				
	G_201A	G_201B	G_201C	G_201D
Q10	77.2	2.7	29.3	82.5
V10	16.4	0.2	3.6	13.6
Q50	186.6	5.5	72.9	200.5
V50	32.5	0.4	7.1	26.8
Q100	243.2	6.8	95.3	261.7
V100	40.1	0.5	8.7	33.0
Q500	418.2	10.5	163.7	448.7
V500	63.4	0.7	13.7	52.1
Ultimate Conditions				
	G_201A	G_201B	G_201C	G_201D
Q10	134.4	3.7	43.0	133.1
V10	18.9	0.3	4.2	16.4
Q50	286.4	6.1	91.6	284.5
V50	34.3	0.4	7.4	29.7
Q100	365.5	7.2	117.3	363.2
V100	41.4	0.5	8.9	35.8
Q500	609.6	10.7	196.3	601.5
V500	63.3	0.7	13.6	54.5

Table 6: Hydrology Results

The calculated flow rates in this report are greater than those presented in the original SSCAFCA HEC-HMS model. The main reason for this is the elimination of the depth-area reduction factor due to subbasin size, following the SSCAFCA Hydrology Manual. Additionally, Smith's assumptions for impervious area are greater than those used in the original HEC-HMS model, which was a broad-scale analysis versus the project-specific modeling done in this study.

HYDRAULIC ANALYSIS

A HEC-RAS model of the existing conditions was established using some of the parameters prepared by the BLE and was updated with the flow rates calculated in the hydrology section of this report. Two-dimensional hydraulic models were developed for the project area using HEC-RAS 5.0.7. The models were used to estimate the extents of potential flood risk by calculating the water surface elevations resulting from the 10-, 50-, 100-, and 500-year storm event in the project area. The proposed conditions update the model to depict the reduction in flood risk.

FLOW PATH CONFIGURATION

A terrain was established using 2018 LiDAR data provided by SSCAFCA and MRCOG specific to the project area. This terrain data was created in New Mexico Central State Plane using the NAVD88 datum. A 2D computational mesh was created from the elevation data with sizes set to 50-square-foot grids. Manning's values used in the project area were obtained using the SSCAFCA Hydrology Manual and the Sediment and Erosion Design Guide. The general observations gathered from the field visit were used to estimate the Manning's n-values, as explained in earlier sections of this report. The table below depicts the Manning N-Values used in the model.

Manning's n-Values	
Area Type	**Manning's n-Value**
Sandy Arroyo or Channel	0.025
Bladed Dirt Roadway	0.02
Paved Roadway	0.017
Open Space / Undisturbed Areas	0.035

Table 7: HEC-RAS Manning's n-Values

PROCEDURE

To perform a 2D analysis specific to the project area, Basin G_201 was divided into basins upstream and downstream of the project area. The flow hydrographs for each basin that were calculated using HEC-HMS were used as the input values in the HEC-RAS model. An upstream boundary condition was set near the point where the two channels meet within Basin G_201A, just north of 27th Avenue. The input hydrograph was added at this boundary condition to model the flows at the project area. The downstream end of the model used a normal depth boundary condition with an average slope of 1.5%.

RESULTS

The model results were similar to the BLE's HEC-RAS analysis – in general, the runoff follows the same drainage path and shows significant potential flooding at the residences within the Nightglow Avenue project area. Flood depths computed along the drainage path in the model reach up to 3.9 feet with the deepest flooding locations

just west of Rainbow Boulevard, on Nightglow Avenue east of Rainbow Boulevard, and in the downstream portion of the project area on Morning Sky Avenue.

The flood risk area is larger than the area estimated by the previous studies due to the increase in flow rates from the BLE report to the Nightglow Avenue project-specific criteria. As discussed in the hydrology section, Smith believes the increase in flow rates can be attributed to the elimination of the depth-area reduction factor and that this study uses a higher percent impervious under existing conditions than the previous HEC-HMS modeling.

The hydraulic modeling of the 100-year 24-hour design storm under existing conditions further enforces the need for a stormwater mitigation solution to reduce the risk of potential flooding in the project area.

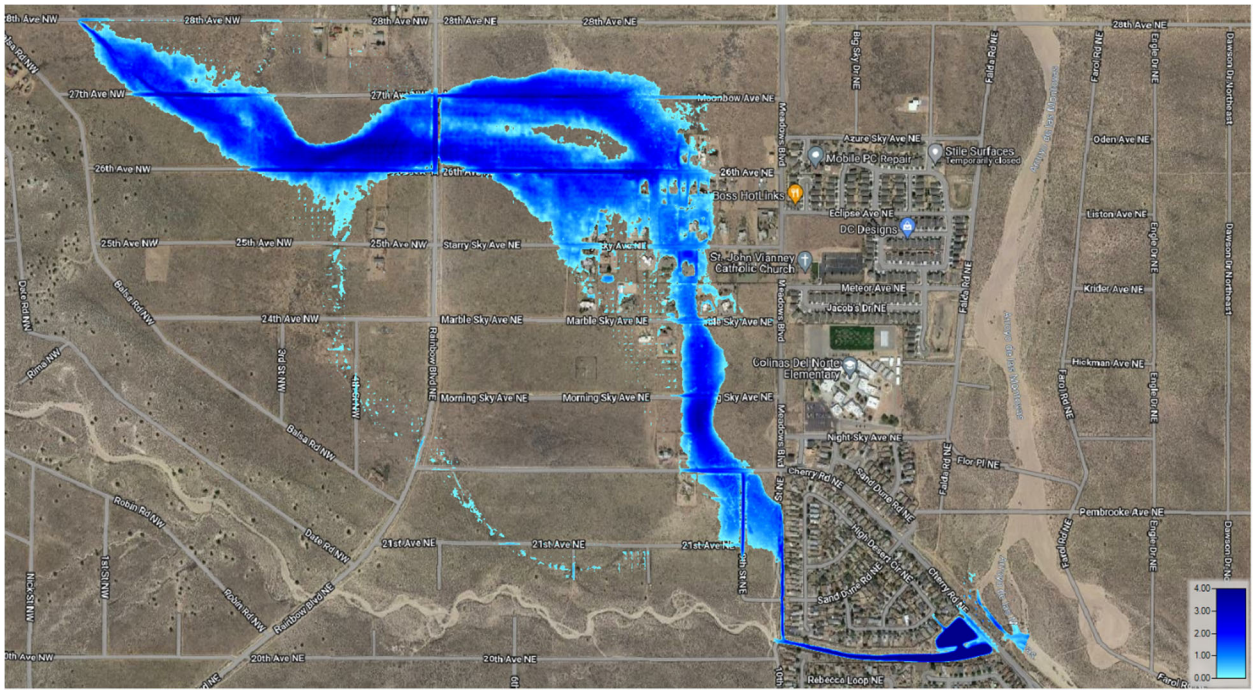


Figure 5: HEC-RAS Model Existing Conditions Results

ALTERNATIVES CONSIDERED

Smith explored numerous alternatives to reduce the flood risk at Nightglow Ave. and compiled the top three viable solutions in order to compare and evaluate them using a selection matrix. The "No Build" alternative is included in the analysis as a benchmark for the proposed improvements. The following alternatives were evaluated in depth:

1. No Build: The no build solution proposes to leave the project area in its current condition without any improvements to mitigate stormwater. While this alternative eliminates upfront costs, it does nothing to relieve the project area of potential flood risk and may become more costly in the future due to required maintenance and clean up of sediment deposit throughout the neighborhood. This option poses the greatest risk to the public and residents.

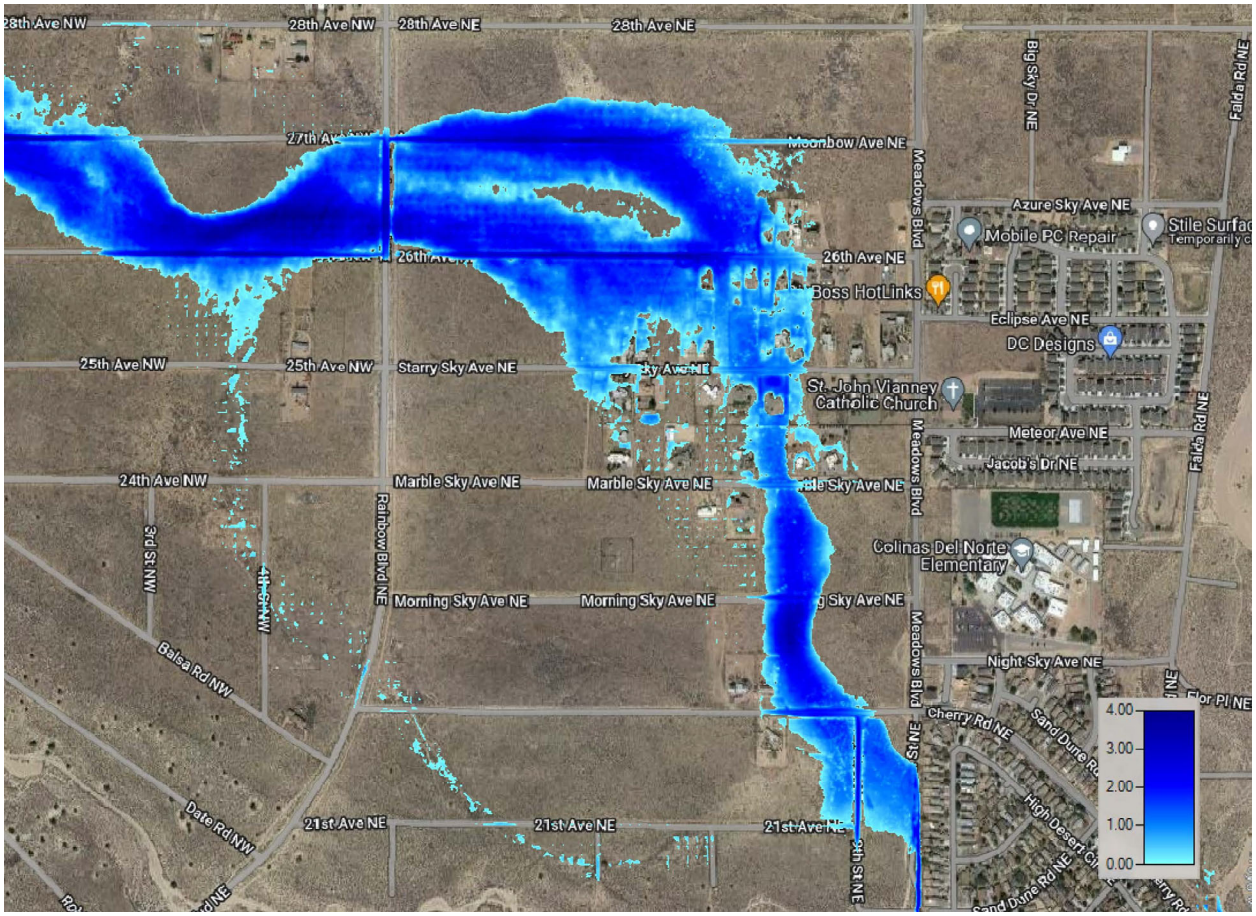


Figure 6: Alternative 1 – No Build

2. Detention Pond and Storm Drain: This alternative proposes a stormwater detention pond at the northwest corner of Rainbow Blvd. and 26th Avenue in the natural arroyo path. This 32 ac-ft pond will attenuate the inflow to approximately 50 cfs, sufficient to be conveyed by a 36-inch RCP storm drain with upsizing to 42-inch in some areas. The storm drain would be routed through Nightglow Avenue, head south on Meadows Boulevard, east on Eclipse Avenue, then cross Falda Road. into the SSCAFCA-owned lots adjacent west of the Montoyas Arroyo. The approximate length of storm drain for this alternative is 5,100 feet. An outfall structure will control discharge of the flows into the Montoyas to minimize erosion along the embankment. This alternative reduces flows substantially, routes them through a storm drain system, and allows conveyance for surface storm water drainage throughout the project area to be collected via inlets connected to the storm drain system. This alternative significantly reduces the potential for flooding in the project area.

   For the pond construction, additional improvements will need to be implemented along 26th Avenue to ensure that the existing stormwater flows are conveyed to the proposed detention pond. It is important to note that in current conditions, lot owners that wish to construct residences on lots within the historical arroyo flow path will need to accommodate the flows in the lot area.

It is also recommended to install inlets along Nightglow Ave. to capture surface flows generated from the areas downstream of the pond within the project area. Six inlets are proposed to pick up and convey these flows to the storm drain system.

Alternative 2 requires acquisition of Lots 15-20, Unit 12 Block 41, located at the northwest corner of Rainbow Blvd. and 26th Ave., encompassing a total of six acres, for the construction of the detention facility. It is anticipated that the storm drain will fit within City of Rio Rancho right-of-way and no additional property will need to be acquired. The outfall of the storm drain will fit within SSCAFCA right-of-way.

The proposed pond will have access ramps for pond maintenance and sediment removal as that is the largest expected maintenance item for this project area. The proposed storm drain size is sufficient for use of vactor/jet trucks to flush out sediment. The improvements are to be designed per SSCAFCA and City of Rio Rancho specifications to ensure proper maintenance can be performed on the system, and in the event that the City of Rio Rancho takes over maintenance responsibilities of the storm drain system. Routine maintenance is required for this alternative to allow the facility to operate to the design intent. At a minimum, sediment should be cleared from the pond and storm drain system on an annual basis and after major storm events. The pond, storm drain, manholes, inlets, and downstream outfall should be inspected at least bi-annually and after major storm events to ensure capacities are met and remove any sediment deposition within the system. Figure 7 depicts the proposed concept for alternative 2.

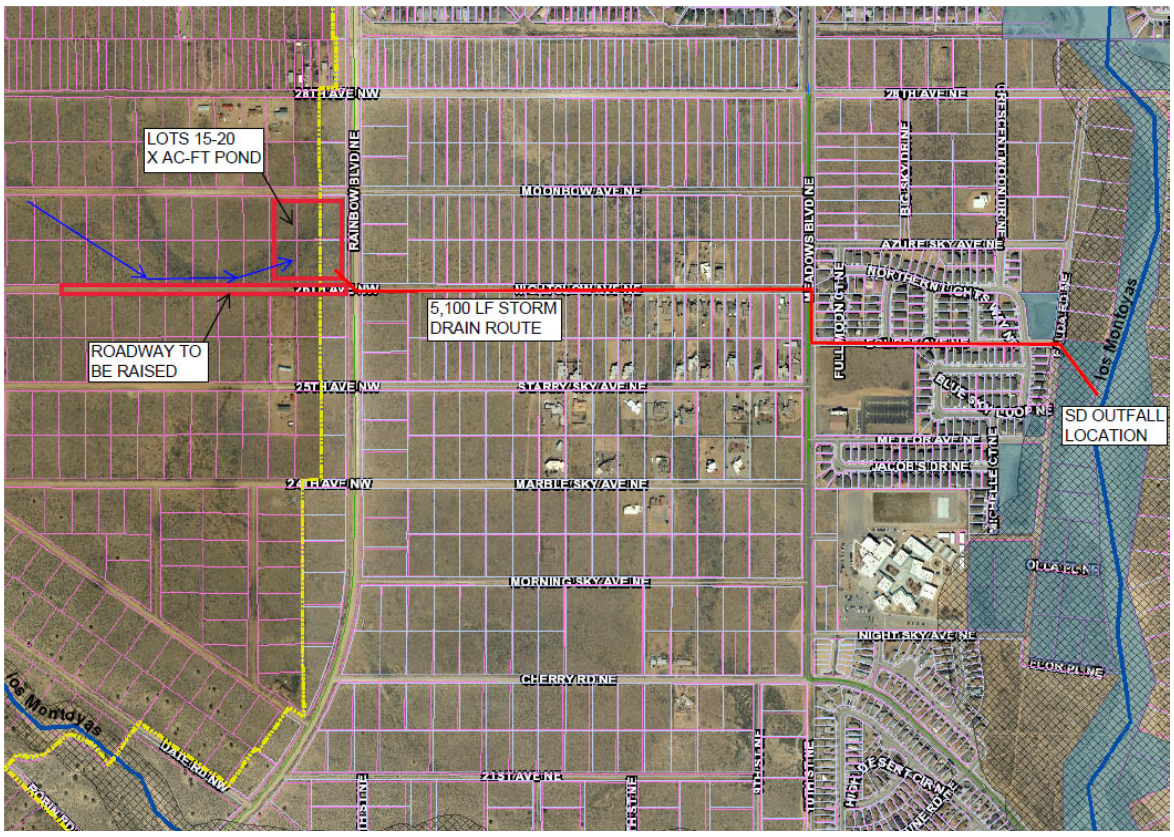


Figure 7: Alternative 2 – Detention Pond and Storm Drain

BLOCK H
UNIT 12

BLOCK 40A
UNIT 12

BLOCK 39
UNIT 12

BLOCK 41
UNIT 12

BLOCK 38
UNIT 12

BLOCK 42
UNIT 12

BLOCK 37
UNIT 12

BLOCK 36
UNIT 12

BLOCK 35
UNIT 12

BLOCK 24
UNIT 12

BLOCK 23
UNIT 12

BLOCK 22
UNIT 12

BLOCK 20
UNIT 12

COUNTY ROW

CORR ROW

28TH AVENUE

27TH AVENUE

26TH AVENUE

25TH AVENUE

24TH AVENUE

MOONBOW AVENUE

STARRY SKY AVENUE

MARBLE SKY AVENUE

MORNING SKY AVENUE

AZURE SKY AVENUE

NORTHERN LIGHTS WAY

ECLIPSE AVENUE

METEOR AVENUE

JACOB'S DRIVE

NIGHT SKY AVENUE

MARLOW MEADOWS DRIVE

PASEO DEL VOLCAN

BIG SKY DRIVE

CRESCENT MOON DRIVE

FALDA ROAD

RAINBOW BOULEVARD

MEADOWS BOULEVARD

MONTOYAS ARROYO

NIGHTGLOW AVENUE

PROPOSED POND EXTENTS

PROPOSED STORM DRAIN

15 16 17

20 19 18

SD

D

LEGEND

- SSCAFCA RIGHT OF WAY
- RIGHT OF WAY TO BE ACQUIRED
- CITY OF RIO RANCHO RIGHT OF WAY
- PRIVATE OWNERSHIP
- COUNTY/CITY BORDER
- PROPOSED MANHOLE

NOTE: ROADWAYS ARE SANDOVAL COUNTY/CORR RIGHT OF WAY

0 200' 400'

N

SSCAFCA
RIO RANCHO, NEW MEXICO 87124

NO.	REVISION DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SSCAFCA
NIGHTGLOW AVENUE FLOOD RISK REDUCTION

FIGURE 8:
ALTERNATIVE 2: ROW ACQUISITION MAP

Solutions for Today...
Vision for Tomorrow

401 N Pennsylvania
Roswell, NM 88201
Phone: 575-622-8866
www.smithengineering.pro

JOB NO:
123103

DATE:
MAY 2023

SHEET NO:
18

3. Detention Pond with Channel & Storm Drain Alternative: This alternative consists of the same detention pond facility described in alternative 2. As with alternative 2, it is important to note that lot owners that wish to construct residences on lots within the historical arroyo flow path will need to accommodate the flows in the lot area.

   However, instead of routing a storm drain through Nightglow Avenue, this alternative proposes a storm drain from the pond east under Rainbow Boulevard to daylight in the back of the lots in Block 38 between Moonbow Avenue and Nightglow Avenue. This storm drain daylights into a channel that conveys stormwater east along the rear of the lots towards Meadows Boulevard. The proposed channel consists of native earth lining and varies in slope from 0.5% to 2% which includes drop structures for grade control. The geometry is a trapezoidal channel with a 10-foot wide bottom and 4:1 side slopes and a 1.5-foot normal water surface depth, providing 1.5 feet of freeboard for an overall channel depth of 3 feet. A 14-foot access road is proposed along the side of the channel to be used for maintenance. The required width for this facility is 70 feet to include room for stockpiling of materials and for vehicle maneuverability. A 35-foot easement is proposed to be obtained on each lot within Block 38 to provide sufficient room for this facility.

   At the downstream end of the proposed channel at Meadows Boulevard, several lots would need to be acquired in order to provide room for a sedimentation basin and storm drain inlet. The storm drain would be routed through Meadows Boulevard east on Azure Sky Avenue, then into the Montoyas Arroyo through a lot to be acquired within Block 20. The approximate length of storm drain for this alternative is 2,000 ft. There are several routes that were analyzed while reviewing this alternative and it was determined that this is the most efficient way to convey the stormwater to the Arroyo.

   The advantages of this alternative are that the incoming flows are reduced substantially through the detention pond and are routed through the proposed channel, which allows room for surface storm water drainage throughout the project area that can be picked up via outfall into the channel. This alternative also provides the room for a neighborhood walking trail along the channel access route that can tie to the existing Hawks Trail along Meadows Boulevard.

   There are several utility crossings required within the storm drain route that will need to be located prior to design of the storm drain system. These utilities include a 12-inch water line in Meadows Boulevard, a 10-inch water line and 8-inch sanitary sewer in Azure Sky Avenue, an 8-inch water line, 8-inch sanitary sewer, and 24-inch storm drain that run parallel with the proposed storm drain within Azure Sky Avenue which will need to have proper horizontal separation, six 24-inch storm drain crossings, and an 18-inch sanitary sewer crossing in Falda Road.

   Alternative 3 requires acquisition of Lots 15-20 Unit 12 Block 41 for the detention pond, Lot 63 Unit 12 Block 38 for storm drain daylight into the channel, 35-foot wide easement dedication on Lots 2-29, 32-61 Unit 12 Block 38 for the channel, acquisition of Lots 30-31 Unit 12 Block 38 for the sedimentation basin at the upstream side of the storm drain, and Lot 7 Unit 12 Block 20 for the storm drain outfall into the Arroyo. It is anticipated that the storm drain will fit within City of Rio Rancho right-of-way and no additional property will need to be acquired for the storm drain route. The required easement width for

the channel provides sufficient remaining lot area to meet the current zoning classification requirements for those lots.

The proposed pond will have access ramps for maintenance and sediment removal as that is the largest expected maintenance item for this project area. The proposed channel geometry is sufficient for maintenance vehicles such as skid loaders to enter the channel and remove sediment from the bottom. The storm drain is sized such that vactor/jet trucks can flush out sediment. The improvements are to be designed to meet SSCAFCA and City of Rio Rancho specifications to ensure proper maintenance can be performed on the system, and in the event that the City of Rio Rancho takes over maintenance responsibilities of the storm drain system. Routine maintenance is required for this alternative to allow the facility to operate to the design intent. At a minimum, sediment should be cleared from the pond, channel, and storm drain system on an annual basis and after major storm events. The system should be inspected bi-annually and after major storm events to ensure capacities are met and remove any sediment deposition within the system.

This alternative has the most property acquisition and easement dedication required. Additionally, there are existing residences with features such as sheds and storage units at the back of the lots which may encroach on the easements obtained. Figure 8 below depicts the proposed concept. Figure 9 depicts the right-of-way acquisition requirements for this alternative.

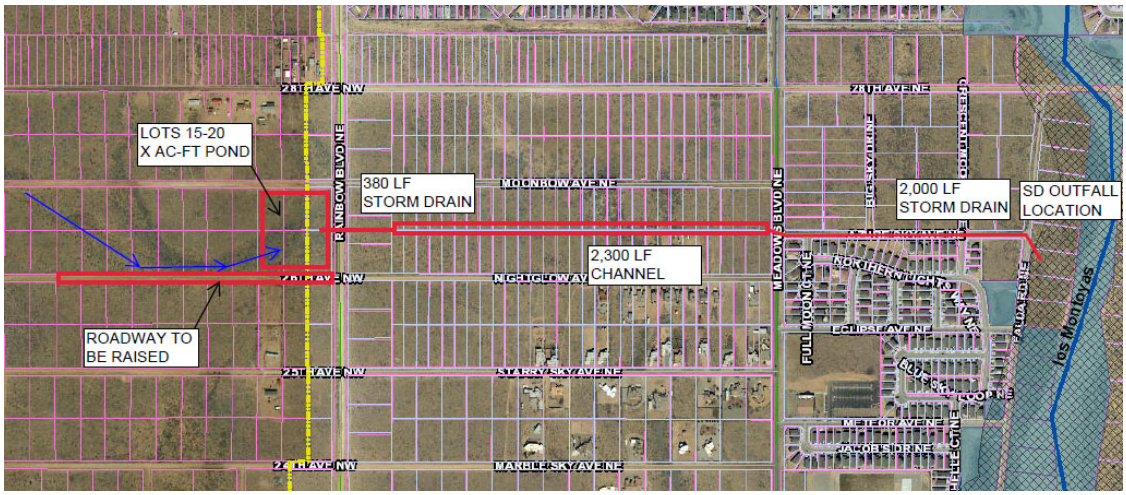


Figure 9: Alternative 3 – Detention Pond and Channel / Storm Drain

SSCAFCA
RIO RANCHO, NEW MEXICO 87124

NO.	REVISION DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

SSCAFCA
NIGHTGLOW AVENUE FLOOD RISK REDUCTION

FIGURE 10:
ALTERNATIVE 3: ROW ACQUISITION MAP

Solutions for Today...
Vision for Tomorrow

401 N Pennsylvania
Roswell, NM 88201
Phone: 575-622-8866
www.smithengineering.pro

JOB NO:
123103

DATE:
MAY 2023

SHEET NO:
21

Two additional alternatives explored and deemed infeasible early in the process are described in the following:

The first alternative is diverting the full flows south from the natural flow path west of Rainbow Boulevard to the Montoyas Arroyo tributary south of 21st Avenue. This was infeasible because the amount of flow from the upstream basin can create flooding issues through the proposed new route for conveyance. Even though the project area flooding would be mitigated, it is likely that new flooding would occur where the flows are diverted without attenuating the flows first. Options explored for this included routing the flows through the residential lots west of Rainbow Boulevard and routing the flows south in a channel adjacent to Rainbow Boulevard. Without attenuating the flows first, the channel geometry would require a large footprint and lead to large amounts of property acquisition to route the flows to the arroyo tributary. Easements would need to encumber entire properties and therefore are infeasible in this scenario. Additionally, there are several high points along the new flow path and forcing stormwater to travel in a direction contrary to its natural flow path is difficult. However, it may be possible to route some of the flows in this direction to alleviate the capacity requirements of downstream facilities.

The second alternative evaluated was raising Rainbow Boulevard to attenuate the incoming flows prior to routing them through a system of storm drain and surface flow. This alternative did not attenuate the flows sufficiently to safely convey the stormwater to the Montoyas Arroyo without still posing a risk of flooding through the project area, as such it was no longer considered.

SELECTION OF AN ALTERNATIVE

An alternative evaluation matrix was used to compare the three most viable solutions for the project. The evaluation criteria include how well the solution mitigates the flood risk flows, the overall cost of the project, easements/right-of-way needed for the project, future maintenance effort required, constructability of the project, and potential environmental impacts to the project site and surrounding area. A maximum of 100 points were divided between the evaluation criteria, with mitigation of flows given the highest priority.

Evaluation Matrix				
Evaluation Criteria	Maximum Points	Alternative 1 No Build	Alternative 2 Pond & SD	Alternative 3 Pond, Channel & SD
Flood Risk Reduction	30	0	30	30
Construction Cost	20	20	8	10
Easements/ROW	15	15	12	2
Maintenance	15	6	10	12
Constructability	10	10	7	7
Environmental	10	10	8	7
Total	**100**	**61**	**75**	**68**

Figure 11: Evaluation Matrix

Flood Risk Reduction: This criteria is the most important element in the evaluation matrix. This is the overall goal of the project therefore this category is weighed heavily as compared to the other categories.

Construction Cost: In order to make the project feasible, the costs of construction must be attainable, which is why this category was also weighed heavily. This category takes into consideration only the costs associated with

completing the project – the assumption was made that the cost to maintain the stormwater infrastructure would be included for consideration under the maintenance category. This criteria takes into consideration the cost of acquiring right-of-way.

Easements/ROW: The complexity of obtaining right-of-way or easements for the construction of improvements was accounted for as a mid-priority category because although the desire is to avoid right-of-way and easement acquisition to the extent possible, it is understood that property acquisition is sometimes a necessary step in providing design solutions. Several alternatives were eliminated early in the process due to the large amounts of right-of-way acquisition required, among other reasons. Alternative 3 performs poorly within this category but was used in the comparison matrix because of its rating in the other categories.

Maintenance: This was categorized as a mid-priority item because maintenance requirements are expected to keep stormwater infrastructure functioning at design levels. This criteria does carry weight due to the limited maintenance resources in SSCAFCA's capacity.

Constructability: A project must be constructable to be feasible. Several alternatives were eliminated due to constructability constraints such as routing stormwater flows to the north after the proposed detention pond due to existing grades.

Environmental: For the purposes of environmental evaluation, Smith reviewed the footprint of currently undisturbed area that will need to be disturbed to install the proposed improvements. An environmental assessment will be performed in a future phase which will provide insight into the project's environmental aspects.

COMMUNITY INPUT

A community meeting will be held to inform the residents within the project area about the project including the analysis and proposed alternatives to mitigate potential flood risk. Smith will lead the meeting and accept public feedback to obtain residents' first-hand experience with current conditions and their suggestions for flood mitigation. SSCAFCA will review the feedback and select a preferred alternative. This section will be updated after the meeting is held to include community feedback.

PERMITTING

SSCAFCA requested a jurisdictional determination on the Montoyas Arroyo in 2020 and received an approved jurisdictional determination (AJD) stating that the Arroyo is excluded from regulation under the Navigable Water protection Rule and that section 404 permitting is not required (see AJD # SPA-2020-00208). The location of the AJD is downstream of the proposed project, so it is assumed that the project will not require Section 404 Permitting. The AJD is valid for five years. A copy of the AJD is included in Appendix E.

The proposed pond is to be designed to be a "non-jurisdictional" dam as defined by the New Mexico Office of the State Engineer (NMOSE). Below is the NMOSE definitions for "jurisdictional" and "non-jurisdictional" dam:

- Jurisdictional Dam: a dam 25 feet or greater in height, which impounds more than 15 acre-feet of water or a dam that impounds 50 acre-feet or more of water and is 6 feet or greater in height.
- Non-jurisdictional Dam: Any dam not meeting the height and storage requirements of a jurisdictional dam. The state engineer does not regulate the design, construction, and operation of a non-jurisdictional

dam unless the dam is unsafe and there is a threat to life or property, as determined by the state engineer. Waters impounded by a non-jurisdictional dam may not be exempt from water right permit requirements; therefore, a separate state water right permit for the water impounded in the reservoir created by a non-jurisdictional dam may be required. Non-jurisdictional dams shall meet the requirements of 19.26.2.15 NMAC unless otherwise exempt.

The project limits are within Sandoval County and the City of Rio Rancho, therefore standard permitting processes should be expected within each jurisdiction for the proposed improvements.

PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

Alternative 2 is the recommended flood-mitigation solution. The proposed project includes installation of a 32-acre-foot pond at the northwest corner of 26th Avenue and Rainbow Boulevard. This will require the acquisition of six one-acre lots (Lots 15-20 Block 41 Unit 12), which will provide sufficient footprint to install the detention facility. The pond is proposed to be 10 feet deep with 6:1 side slopes and a 14-foot access road around the perimeter with 10:1 maximum longitudinal slopes to the bottom of the pond for maintenance access. The pond bottom will be native material and the slopes are to be re-seeded with native vegetation.

In addition, 26th Avenue is to be raised approximately 2 feet using the pond excavation spoils to a point approximately 300 feet upstream of the natural flow path. The north side of the roadway will convey the stormwater flows as it currently does under existing conditions through the public right-of-way and within private property. The properties upstream of this facility will be required to continue to allow the conveyance of the stormwater flows to the pond site as the flows have been conveyed in historic conditions. This can be through natural conveyance of the flows or through engineered conveyance systems. The raising of 26th Avenue will still allow the surface discharge of stormwater flows to the pond from the surrounding areas.

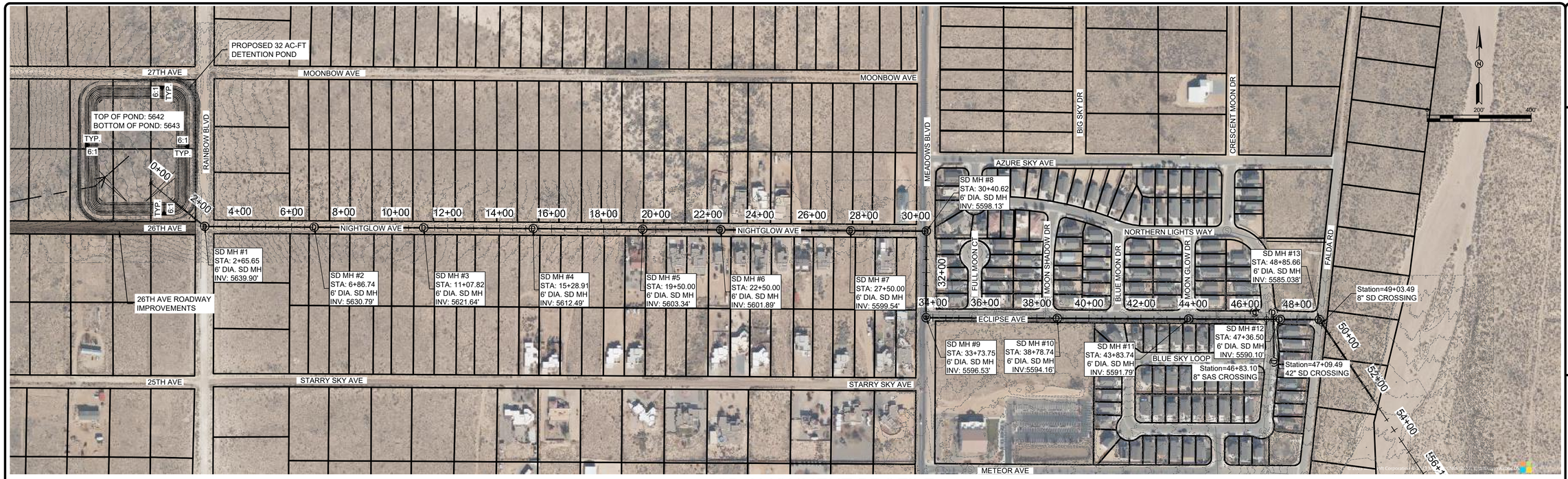
A 36-inch RCP storm drain is proposed to be routed from the pond into Nightglow Avenue. This storm drain is modeled to accept the attenuated flow rate of 50 CFS from the detention facility. There is a change in slope in the storm drain to reduce the depth of bury through the high point in Nightglow Avenue before reaching Meadows Boulevard. This change in slope requires the storm drain to be upsized to 42-inch for the remainder of the route. This also allows conveyance for the additional flows around the project area to be routed into the storm drain. Six inlets will be provided in Nightglow Avenue to accept the remaining surface flows from the basin that do not reach the detention pond. This includes surface drainage from Blocks H, 38, and 39, and a portion of Block 37.

The storm drain is routed south on Meadows Boulevard then east along Eclipse Avenue with an eventual crossing of Falda Road and outfall into the Montoyas Arroyo through SSCAFCA-owned Lots 10 and 11 in Block 20. An outfall will be installed within these lots to control discharge into the arroyo.

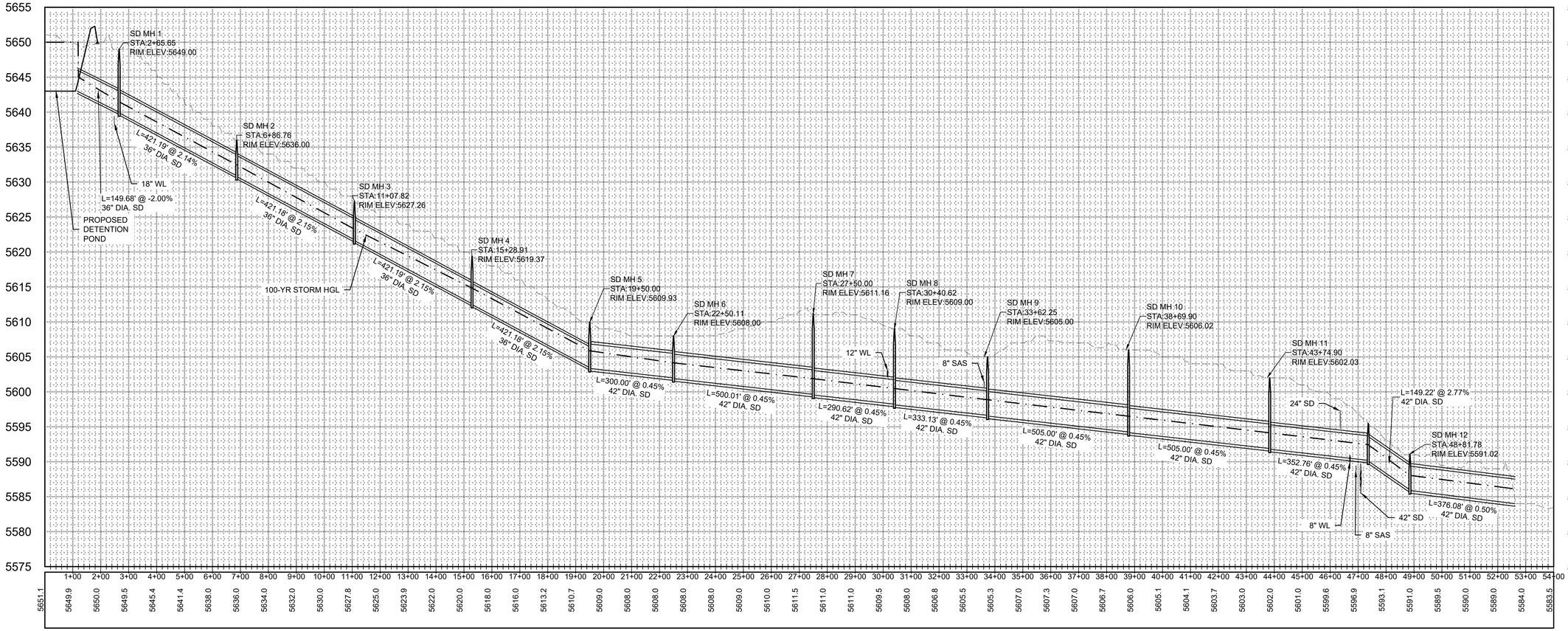
There are several utility crossings required within the storm drain route to be located prior to design of the storm drain system. There is an 18-inch water line identified within Rainbow Boulevard and a 12-inch water line in Meadows Boulevard that the storm drain will need to cross. An 8-inch sanitary sewer line along Meadows Boulevard, an 18-inch sanitary sewer line along Falda Road, and the following utilities within Eclipse Boulevard have been identified and will need to be located for storm drain design: 8-inch sanitary sewer, 10-inch water line, 24-inch storm drain, and 42-inch storm drain. The proposed storm drain alignment is currently shown to avoid these utilities, whose depths were estimated based on as-built information. Figure 12 shows a plan and profile of the proposed storm drain alignment.

The estimated total project cost for alternative 2 is $6,375,000. This cost includes property acquisition based on Sandoval County Assessor's Office land values, construction costs, a 30% contingency, and NMGRT. A detailed breakdown of the cost for alternative 2 is provided in Figure 13.

Topographic Surveying, Environmental, and Cultural Resource documentation will be completed and may alter the course of design.



SD ALIGNMENT PROFILE



SSCAFCA
NIGHTGLOW AVENUE FLOOD RISK REDUCTION

FIGURE 12
ALTERNATIVE 2: DETENTION POND AND STORM DRAIN

SSCAFCA
RIO RANCHO, NEW MEXICO

NO.	DESCRIPTION	DATE	BY
5	#####	#####	###
4	#####	#####	###
3	#####	#####	###
2	#####	#####	###
1	#####	#####	###

Solutions for Today...
Vision for Tomorrow

401 N Pennsylvania
Roswell, NM 88201
Phone: 575-622-3866
www.smithengineering.pro

JOB NO: 123103

DATE: MAY 2023

SHEET NO: 26

Alternative 2: Engineer's Opinion of Cost					
Bid Item No.	**Item Description**	**Est. Qty.**	**Unit**	**Unit Price**	**Amount**
DETENTION POND					
1	Clearing and Grubbing	1	LS	$ 10,000.00	$ 10,000.00
2	Unclassified Material Excavation, Embankment and Haul	48000	CY	$ 15.00	$ 720,000.00
3	6" Basecourse, Maintenance Access Roads	3500	SY	$ 15.00	$ 52,500.00
4	Subgrade Prep, 12" at 95% Compaction	3500	SY	$ 10.00	$ 35,000.00
5	Fencing	2100	LF	$ 50.00	$ 105,000.00
6	8" Structural RPCC Inflow Structure	1	LS	$ 20,000.00	$ 20,000.00
7	8" Structural RPCC Outlet Structure incl. Emergency Spillway	1	LS	$ 60,000.00	$ 75,000.00
8	16' Standard Gate	2	EA	$ 2,000.00	$ 4,000.00
9	Native Reseeding	6	AC	$ 5,000.00	$ 30,000.00
				DETENTION POND (Subtotal of Bid Items 1 through 9)	**$ 1,051,500.00**
26TH AVE. ROADWAY IMPROVEMENTS					
10	Clearing and Grubbing	1	LS	$ 5,000.00	$ 5,000.00
11	Grading Areas not to be Paved (less than 2' - 26th Ave.)	7500	SY	$ 6.00	$ 45,000.00
12	Native Reseeding	1	AC	$ 5,000.00	$ 5,000.00
				26TH AVE. ROADWAY IMPROVEMENTS (Subtotal of Bid Items 10 through 12)	**$ 55,000.00**
STORM DRAIN					
13	24" RCP SD, IV	120	LF	$ 120.00	$ 14,400.00
14	36" RCP SD, IV	1840	LF	$ 185.00	$ 340,400.00
15	42" RCP SD, IV	3310	LF	$ 195.00	$ 645,450.00
16	Trenching, 18"-36" SD, 8'-12'	1960	LF	$ 100.00	$ 196,000.00
17	Trenching, 42"-60" SD, 8'-12'	3310	LF	$ 140.00	$ 463,400.00
18	MH, 6' DIA., TYPE C OR E, 6'-10' DEPTH	9	EA	$ 15,000.00	$ 135,000.00
19	MH, 6' DIA., TYPE C OR E, 10'-14' DEPTH	4	EA	$ 18,000.00	$ 72,000.00
20	Catch Basin, D, DG	6	EA	$ 8,000.00	$ 48,000.00
21	AC Pavement, <4", Sawcut, Remove & Dispose	2600	SY	$ 10.00	$ 26,000.00
22	Subgrade Prep, 12" at 95% Compaction	2600	SY	$ 5.00	$ 13,000.00
23	Aggregate Base Course, 6" at 95% Compaction	2600	SY	$ 15.00	$ 39,000.00
24	Asphalt concrete, 3"	2600	SY	$ 55.00	$ 143,000.00
				STORM DRAIN (Subtotal of Bid Items 13 through 24)	**$ 2,135,650.00**
OUTLET STRUCTURE					
25	Clearing and Grubbing	1	LS	$ 7,500.00	$ 7,500.00
26	Unclassified Material Excavation, Embankment and Haul	9000	CY	$ 15.00	$ 135,000.00
27	6" Basecourse, Maintenance Access Roads	1300	SY	$ 15.00	$ 19,500.00
28	Subgrade Prep, 12" at 95% Compaction	1300	SY	$ 10.00	$ 13,000.00
29	Fencing	1250	LF	$ 50.00	$ 62,500.00
30	8" Structural RPCC Outlet Structure	1	LS	$ 30,000.00	$ 30,000.00
31	16' Standard Gate	1	EA	$ 2,000.00	$ 2,000.00
32	Embankment Rip Rap Armoring, Class C	1500	SY	$ 200.00	$ 300,000.00
33	Native Reseeding	2	AC	$ 5,000.00	$ 10,000.00
				STORM DRAIN (Subtotal of Bid Items 25 through 33)	**$ 579,500.00**
				Subtotal Items 1 through 33	**$ 3,821,650.00**
34	Mobilization (5% of above subtotal)	1	LS	$ 191,082.50	$ 191,082.50
35	Construction Project Sign, complete in place.	2	EA	$ 2,500.00	$ 5,000.00
36	Construction Surveying	1	LS	$ 50,000.00	$ 50,000.00
37	NPDES Permitting	1	LS	$ 25,000.00	$ 25,000.00
38	Temporary Traffic Control	1	LS	$ 50,000.00	$ 50,000.00
39	Control of Storm Water and Nuisance Flow	1	LS	$ 25,000.00	$ 25,000.00
a)	Base Bid - Subtotal of Bid Items No. 1 through No. 39				$ 4,167,732.50
b)	Contingency - 30% of line (a)				$ 1,250,319.75
	Allowances				
	Construction Materials Testing	1	ALLOW	$ 75,000.00	
	Utility Relocation	1	ALLOW	$ 125,000.00	
c)	Allowances Subtotal				$ 200,000.00
d)	New Mexico Gross Reciepts Tax (NMGRT) 7.5625% of (sum of lines a+b+c)				$ 424,865.20
e)	**Construction Total** (sum of lines a+b+c+d)				**$ 6,042,917.45**
Estimated Professional Services Costs					
f)	Bidding & Negotiations Phase				$ 15,000.00
g)	Construction Phase Professional Services				$ 100,000.00
h)	Part-time Construction Observation, 80hr/month for 10 months				$ 100,000.00
i)	Subtotal (Sum of lines f + g + h)				$ 215,000.00
j)	New Mexico Gross Reciepts Tax (NMGRT) (7.5625% of line i)				$ 16,259.38
k)	**Professional Services Total** (sum of lines i + j)				**$ 231,259.38**
l)	Property Acquisition				$ 100,000.00
				Total Project Cost (Rounded sum of lines e + k + l)	**$ 6,375,000.00**

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction cost are made on the basis of the Consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or the negotiated cost of the Work will not vary from the Consultant's estimate of probable construction cost.

Figure 13: Alternative 2 – Engineer's Opinion of Probable Costs

CONCLUSION

This Alternative Analysis Report updated the existing hydrologic and hydraulic models and calculations for the Montoyas Arroyo watershed specific to the Nightglow Project Area within Basin G_201 from the MWP. The potential flood risk to the project area was analyzed using the updated calculations and models using the 100-year 24-hour design storm as the basis for design. Additional storms such as the 10-year, 50-year, and 500-year design storms were also used to analyze flood risk but were not used for design of proposed improvements.

Various alternatives for flood mitigation were explored during the preparation of this report. The viable solutions were reviewed in depth and compared using an evaluation matrix based on criteria such as flow mitigation, project costs, right-of-way / easement acquisition requirements, maintenance requirements, project constructability, and environmental assessments. Alternative 2 – a 32 ac-ft, 10-ft deep detention facility with a 42-inch storm drain route to the Montoyas Arroyo is recommended as the best alternative to mitigate stormwater flows. Additional improvements include raising 26th Avenue to ensure proper conveyance of stormwater flows to the pond and strategic inlet placing to pick up surface stormwater flows that are downstream of the proposed pond and upstream of the project area.

This alternative will require acquisition of six one-acre lots to provide room for the detention facility. It is recommended that coordination for property acquisition commence early in the design process to minimize potential project delays. Additionally, because this project is within the City of Rio Rancho and is mitigating potential flood risk within their jurisdiction, the City may take over the maintenance responsibilities of the storm drain. As such, coordination with the City should be completed early in the design process so that the details of ownership and maintenance can be established, as well as ensuring that the storm drain design follows the City's required specifications.

REFERENCES

1. Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) (2021). Montoyas Watershed Park Management Plan (**https://www.sscafca.org/resources/watershed-management-plans/**)
2. Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) (2010). Final Development Process Manual for Southern Sandoval County Arroyo Flood Control Authority and the City of Rio Rancho, New Mexico, Chapter 22.
3. Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) (2021). SSCAFCA Hydrology Manual v1.1 (**https://www.sscafca.org/wp-content/uploads/2021/03/SSCAFCA_Hydrology_Manual_Mar_2021.pdf**)
4. Mussetter Engineering Inc. (2008) Sediment and Erosion Design Guide, prepared for SSCAFCA (https://www.sscafca.org/development/documents/sediment_design_guide/Sediment%20Design%20Guide%2012-30-08.pdf)
5. ESP Associates Inc. (2019). Base Level Engineering for Southern Sandoval County Arroyo Flood Control Authority, New Mexico.
6. Sandoval County, Assessor's Office (2022). EagleWeb (**https://eaweb.sandovalcountynm.gov/Assessor/web/**)
7. National Oceanic and Atmospheric Administration (NOAA) (2022). Precipitation Frequency Data Server (PFDS) Atlas 14 (**https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_printpage.html?lat=35.2628&lon=-106.7932&data=depth&units=english&series=pds#table**)
8. National Engineering Handbook (NEH), United States Department of Agriculture (USDA), Part 630 Hydrology Chapter 15.
9. Urban Hydrology for Small Watersheds, TR-55 (1986), United States Department of Agricultures (USDA), Natural Resources Conservation Services (NRCS), Conservation Engineering Division (CED)

APPENDIX A: ANNOTATED PHOTOGRAPHS

s

Photo 1: 28th Avenue and Meadows Boulevard Intersection (facing southeast)

Photo 2: 28th Avenue (facing west)

Photo 3: Land coverage of project area (facing west)

Photo 4: Land coverage of project area (facing east)

Photo 5: Bladed dirt road (facing east)

Photo 6: Bladed dirt road (facing east)

Photo 7: Upstream Basin G_201A

Photo 8: Basin G_201A Channel

Photo 9: Bladed Dirt Road Upstream Basin G_201A

Photo 10: Upstream Channel Basin G_201A

APPENDIX B: HYDROLOGY

1. NOAA Atlas 14 Rainfall Data
2. Hydrology Input Tables
3. HEC-HMS Results 10-yr Existing
4. HEC-HMS Results 50-yr Existing
5. HEC-HMS Results 100-yr Existing
6. HEC-HMS Results 500-yr Existing
7. HEC-HMS Results 10-yr Ultimate
8. HEC-HMS Results 50-yr Ultimate
9. HEC-HMS Results 100-yr Ultimate
10. HEC-HMS Results 500-yr Ultimate

NOAA Atlas 14, Volume 1, Version 5
Location name: Rio Rancho, New Mexico, USA*
Latitude: 35.3133°, Longitude: -106.7527°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.180** (0.155-0.209)	**0.234** (0.201-0.271)	**0.313** (0.268-0.364)	**0.374** (0.320-0.433)	**0.458** (0.389-0.530)	**0.522** (0.442-0.605)	**0.590** (0.496-0.683)	**0.661** (0.553-0.765)	**0.758** (0.628-0.878)	**0.836** (0.688-0.969)
10-min	**0.274** (0.236-0.318)	**0.355** (0.305-0.412)	**0.476** (0.408-0.553)	**0.569** (0.486-0.659)	**0.696** (0.593-0.807)	**0.795** (0.674-0.921)	**0.899** (0.756-1.04)	**1.01** (0.843-1.16)	**1.16** (0.956-1.34)	**1.27** (1.05-1.47)
15-min	**0.339** (0.292-0.394)	**0.440** (0.378-0.510)	**0.590** (0.506-0.686)	**0.706** (0.603-0.817)	**0.864** (0.735-1.00)	**0.986** (0.835-1.14)	**1.11** (0.937-1.29)	**1.25** (1.05-1.44)	**1.43** (1.19-1.66)	**1.58** (1.30-1.83)
30-min	**0.457** (0.393-0.531)	**0.593** (0.509-0.687)	**0.795** (0.682-0.924)	**0.951** (0.812-1.10)	**1.16** (0.990-1.35)	**1.33** (1.13-1.54)	**1.50** (1.26-1.74)	**1.68** (1.41-1.94)	**1.93** (1.60-2.23)	**2.13** (1.75-2.46)
60-min	**0.566** (0.487-0.657)	**0.734** (0.630-0.851)	**0.983** (0.843-1.14)	**1.18** (1.00-1.36)	**1.44** (1.23-1.67)	**1.64** (1.39-1.90)	**1.86** (1.56-2.15)	**2.08** (1.74-2.41)	**2.39** (1.98-2.76)	**2.63** (2.16-3.05)
2-hr	**0.660** (0.564-0.783)	**0.847** (0.721-1.01)	**1.12** (0.951-1.33)	**1.34** (1.13-1.58)	**1.64** (1.38-1.93)	**1.89** (1.57-2.21)	**2.14** (1.78-2.51)	**2.41** (1.98-2.82)	**2.79** (2.27-3.26)	**3.09** (2.49-3.62)
3-hr	**0.709** (0.610-0.837)	**0.901** (0.774-1.06)	**1.18** (1.01-1.39)	**1.40** (1.20-1.65)	**1.71** (1.45-2.00)	**1.95** (1.65-2.29)	**2.21** (1.86-2.59)	**2.49** (2.08-2.92)	**2.88** (2.37-3.36)	**3.19** (2.60-3.73)
6-hr	**0.818** (0.711-0.956)	**1.03** (0.900-1.21)	**1.33** (1.16-1.55)	**1.56** (1.35-1.82)	**1.88** (1.62-2.19)	**2.13** (1.83-2.47)	**2.40** (2.04-2.78)	**2.67** (2.26-3.09)	**3.05** (2.55-3.53)	**3.35** (2.78-3.88)
12-hr	**0.922** (0.812-1.05)	**1.16** (1.02-1.33)	**1.47** (1.29-1.68)	**1.72** (1.50-1.96)	**2.05** (1.78-2.33)	**2.31** (2.00-2.62)	**2.57** (2.22-2.92)	**2.85** (2.44-3.23)	**3.22** (2.73-3.66)	**3.51** (2.96-4.00)
24-hr	**1.08** (0.955-1.22)	**1.35** (1.20-1.54)	**1.70** (1.51-1.93)	**1.97** (1.75-2.23)	**2.35** (2.07-2.66)	**2.63** (2.31-2.98)	**2.93** (2.57-3.31)	**3.24** (2.82-3.66)	**3.66** (3.16-4.12)	**3.98** (3.42-4.49)
2-day	**1.15** (1.02-1.30)	**1.45** (1.29-1.64)	**1.83** (1.62-2.06)	**2.12** (1.88-2.39)	**2.53** (2.23-2.84)	**2.84** (2.50-3.19)	**3.17** (2.78-3.56)	**3.51** (3.05-3.94)	**3.96** (3.43-4.46)	**4.32** (3.71-4.87)
3-day	**1.29** (1.17-1.43)	**1.61** (1.46-1.79)	**2.01** (1.81-2.22)	**2.32** (2.09-2.56)	**2.74** (2.47-3.03)	**3.07** (2.75-3.39)	**3.40** (3.04-3.75)	**3.74** (3.33-4.13)	**4.19** (3.71-4.64)	**4.55** (4.00-5.04)
4-day	**1.43** (1.31-1.56)	**1.77** (1.63-1.94)	**2.19** (2.01-2.38)	**2.51** (2.31-2.73)	**2.95** (2.70-3.21)	**3.29** (3.00-3.58)	**3.63** (3.30-3.95)	**3.97** (3.60-4.32)	**4.43** (4.00-4.82)	**4.78** (4.29-5.21)
7-day	**1.65** (1.52-1.80)	**2.05** (1.89-2.23)	**2.52** (2.32-2.73)	**2.87** (2.65-3.12)	**3.35** (3.08-3.63)	**3.71** (3.40-4.02)	**4.07** (3.72-4.41)	**4.42** (4.03-4.79)	**4.88** (4.44-5.30)	**5.23** (4.73-5.68)
10-day	**1.84** (1.70-1.99)	**2.29** (2.11-2.48)	**2.81** (2.59-3.04)	**3.22** (2.97-3.49)	**3.77** (3.47-4.07)	**4.19** (3.84-4.52)	**4.61** (4.21-4.97)	**5.02** (4.58-5.43)	**5.57** (5.05-6.02)	**5.98** (5.40-6.48)
20-day	**2.36** (2.17-2.56)	**2.93** (2.71-3.18)	**3.58** (3.30-3.87)	**4.06** (3.74-4.39)	**4.68** (4.31-5.06)	**5.14** (4.72-5.55)	**5.58** (5.11-6.02)	**6.00** (5.49-6.48)	**6.54** (5.96-7.07)	**6.93** (6.30-7.50)
30-day	**2.86** (2.64-3.09)	**3.56** (3.29-3.84)	**4.30** (3.97-4.63)	**4.85** (4.47-5.22)	**5.55** (5.11-5.96)	**6.05** (5.56-6.50)	**6.53** (5.99-7.01)	**6.98** (6.39-7.50)	**7.54** (6.88-8.11)	**7.94** (7.23-8.55)
45-day	**3.51** (3.25-3.78)	**4.35** (4.03-4.69)	**5.20** (4.81-5.60)	**5.82** (5.38-6.26)	**6.57** (6.07-7.07)	**7.10** (6.56-7.64)	**7.59** (7.00-8.16)	**8.04** (7.40-8.64)	**8.57** (7.88-9.22)	**8.93** (8.20-9.62)
60-day	**4.04** (3.75-4.36)	**5.02** (4.65-5.40)	**6.01** (5.57-6.46)	**6.71** (6.23-7.22)	**7.58** (7.02-8.15)	**8.17** (7.57-8.79)	**8.73** (8.07-9.39)	**9.24** (8.54-9.95)	**9.84** (9.08-10.6)	**10.2** (9.45-11.0)

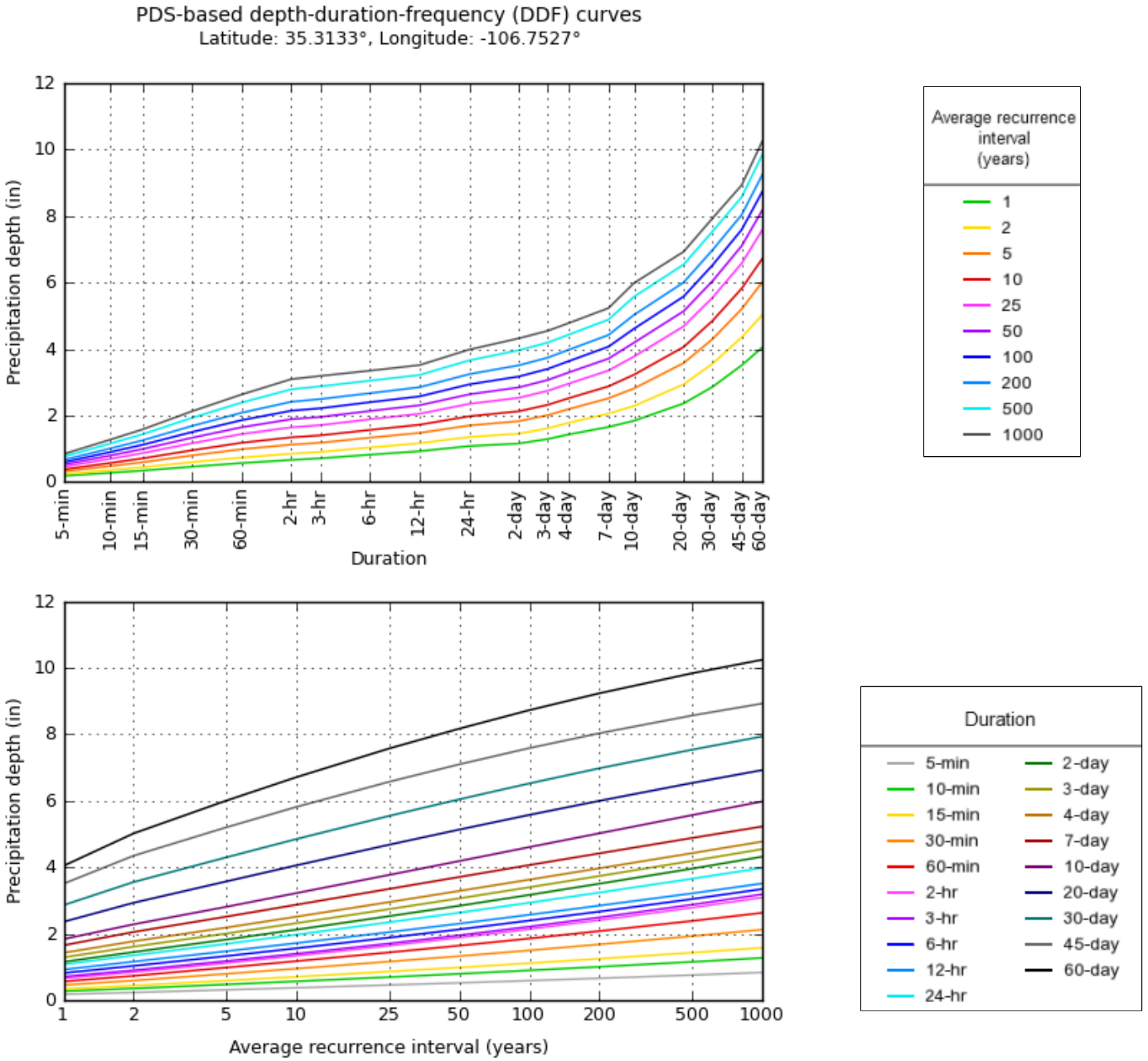
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



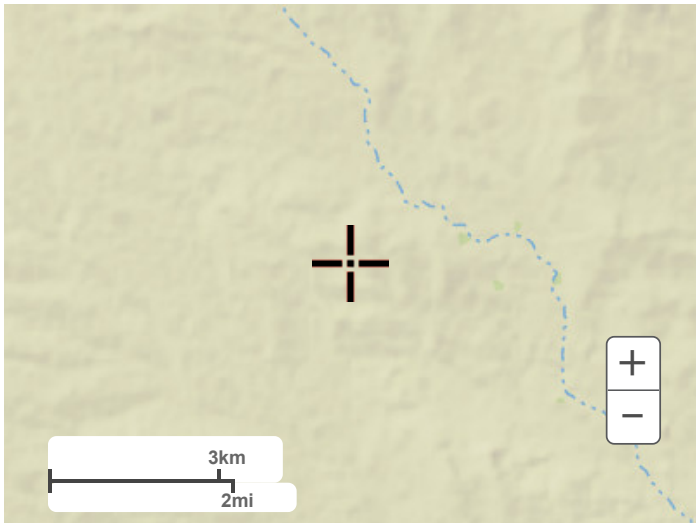
NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Thu Mar 23 14:31:26 2023

Back to Top

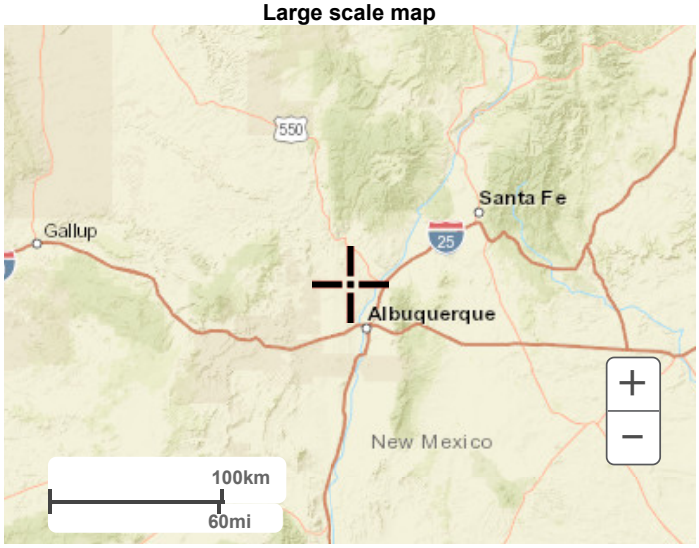
Maps & aerials

Small scale terrain

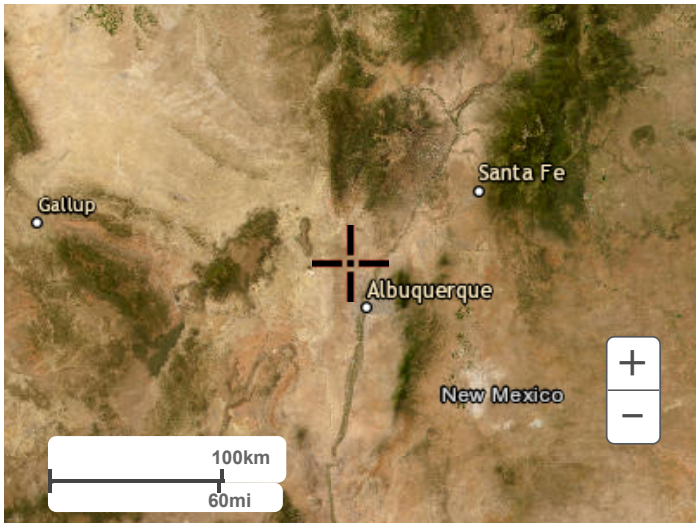


Large scale terrain

Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Partial-Duration Depth (inches)				
	Design Storm Event (year)			
Duration	**10**	**50**	**100**	**500**
5 Minutes	0.374	0.522	0.589	0.758
15 Minutes	0.706	0.986	1.11	1.43
1 Hour	1.18	1.64	1.85	2.39
2 Hours	1.34	1.89	2.13	2.79
3 Hours	1.4	1.95	2.2	2.88
6 Hours	1.56	2.13	2.39	3.05
12 Hours	1.72	2.31	2.55	3.22
24 Hours	1.97	2.63	2.9	3.66

*Depths for the 10-, 50-, and 500-year storm event were obtained from NOAA Atlas 14 at time of AAR preparation

*Depths for the 100-year storm event were unaltered from the SSCAFCA HEC-HMS model.

DCIA/UIA Assumptions			
Land Use Type	**Assumption**	**DCIA**	**UIA**
Residential Roof	2,000 SF	50%	50%
Backyard Imp.	2% of lot area	0%	100%
Residential Drive	500 SF	100%	0%
Paved Road	24 ft width	100%	0%
Sidewalk	6 ft width	0%	100%
Rural Road	24 ft width	0%	100%

Curve Number Calculations: Existing Conditions									
			DCIA	**UIA**	**Graded Area**	**Open Space**	**Unpaved Road**		
		CN	% Imp	98	86	74	82		
Basin	**Area (ac)**	**Residences**	**Area (ac)**	**Area (ac)**	**Area (ac)**	**Area (ac)**	**Area (ac)**	**Composite CN**	**% Impervious**
G_201A	461.2	25	0.9	1.1	20.0	393.9	45.3	75	0.2%
G_201B	3.9	0	0.0	0.0	0.0	0.0	3.9	82	0.0%
G_201C	98.1	20	0.7	0.9	4.5	82.5	9.5	75	0.7%
G_201D	375.8	40	1.4	1.7	18.0	320.7	34.0	75	0.4%

Curve Number Calculations: Ultimate Conditions											
					DCIA	**UIA**	**Graded Area**	**Open Space**	**Residential Yard**		
				CN	% Imp	98	86	74	80		
Basin	**Area (ac)**	**1-Acre Lots**	**1/2-Acre Lots**	**1/3-Acre Lots**	**Area (ac)**	**Area (ac)**	**Area (ac)**	**Area (ac)**	**Area (ac)**	**Composite CN**	**% Impervious**
G_201A	461.2	98	527	72	38.5	14.2	65.9	164.1	178.5	73	8.3%
G_201B	3.9	0	0	0	1.3	0.0	2.6	0.0	0.0	58	32.9%
G_201C	98.1	6	119	54	10.6	3.5	14.8	33.3	36.0	72	10.8%
G_201D	375.8	268	67	0	24.8	8.2	74.3	120.6	147.9	75	6.6%

Summary of Hydrology Input Parameters										
	Existing Conditions					Ultimate Conditions				
Subbasin	Area (ac)	CN	Imp. Area (%)	Tc (min)	Lag Time (min)	Area (ac)	CN	Imp. Area (%)	Tc (min)	Lag Time (min)
G_201A	461.2	75	0.2%	75	45.3	461.2	73	8.3%	41	24.8
G_201B	3.9	82	0.0%	24	14.6	3.9	70	32.9%	18	10.8
G_201C	98.1	75	0.7%	30	17.9	98.1	72	10.8%	19	11.6
G_201D	375.8	75	0.4%	51	30.5	375.8	75	6.6%	34	20.4

NIGHTGLOW AVE FLOOD RISK REDUCTION
TIME OF CONCENTRATION AND LAG TIME COMPUTATIONS

		Existing Conditions					Ultimate Conditions			
Subbasin Name		G_201A	G_201B	G_201C	G_201D		G_201A	G_201B	G_201C	G_201D
Subbasin Area (acres)		461.2	3.9	98.1	375.8		461.2	3.9	98.1	375.8
Number of Reaches		3	2	3	3		3	2	3	3
1 - SHEET FLOW										
Surface Description (a)										
Manning's Coeff., n (a - Table 3-1)		0.035	0.035	0.035	0.035		0.03	0.02	0.03	0.03
Flow Length (L) (b)	ft	300	300	300	300		100	300	100	100
Highest Elevation (b)	ft	5845	5728	5648	5685		5845	5728	5648	5685
Lowest Elevation (b)	ft	5830	5718	5644	5679		5843	5718	5647	5683
Slope (S)	ft / ft	0.050	0.033	0.013	0.020		0.020	0.033	0.010	0.020
2-year 24-hour rainfall depth (P2) (c)	inches	1.35	1.35	1.35	1.35		1.35	1.35	1.35	1.35
Travel Time Tt = (0.007(n L)^0.8) / ((P2)^0.5 (S^0.4))	hours	0.13	0.15	0.22	0.19		0.07	0.10	0.09	0.07
2 - SHALLOW CONCENTRATED FLOW										
Surface Description (a)										
Flow Length (L) (b)	ft	2000	2000	700	2000		2000	2000	900	2000
Highest Elevation (b)	ft	5830	5718	5644	5679		5843	5718	5647	5683
Lowest Elevation (b)	ft	5820	5682	5636	5638		5824	5682	5636	5642
Slope (S)	ft / ft	0.005	0.018	0.011	0.021		0.010	0.018	0.012	0.021
Average Velocity (e - Figure 15-4)	ft / sec	0.75	2.20	1.10	1.40		2.00	2.75	1.70	2.10
Travel Time Tt = Tt = L / (3600*V) (a)	hours	0.74	0.25	0.18	0.40		0.28	0.20	0.15	0.26
3 - OPEN CHANNELS										
Channel Description (a)		CHANNEL	CHANNEL	CHANNEL	CHANNEL		CHANNEL	CHANNEL	CHANNEL	CHANNEL
Manning's n (d)		0.035	0.035	0.035	0.035		0.03	0.035	0.03	0.03
Channel Shape (b)		CHANNEL XS	CHANNEL XS	CHANNEL XS	CHANNEL XS		CHANNEL XS	CHANNEL XS	CHANNEL XS	CHANNEL XS
Side Slopes (b)	1V:XH	20	0	40	20		20	0	40	20
Bottom Width (b)	ft	10	0	10	20		10	0	10	20
Depth (D)	ft	1	0	1	1		1	0	1	1
Top Width (T)	ft	50	0	90	60		50	0	90	60
Wetted Perimeter (P)	ft	50	0	90	60		50	0	90	60
Area (A)	sq ft	30	0	50	40		30	0	50	40
Hyraulic Radius (A / P)	ft	0.60	#DIV/0!	0.56	0.67		0.60	#DIV/0!	0.56	0.67
Hydraulic Depth (y) = A / T	ft	0.60	#DIV/0!	0.56	0.67		0.60	#DIV/0!	0.56	0.67
Entire Flowpath Length	ft	8800		2125	5950		8800		2125	5950
Open Channel Flow Length (L) (b)	ft	6500	-2300	1125	3650		6700	-2300	1125	3850
Highest Elevation (b)	ft	5820	5682	5636	5638		5824	5682	5636	5642
Lowest Elevation (b)	ft	5665	0	5622	5586		5665	0	5622	5586
Slope (S)	ft / ft	0.024	-2.470	0.012	0.014		0.024	-2.470	0.012	0.015
Average Velocity (a)										
V = (1.49 R ^ 0.666 S ^ 0.5) / n (a)	ft / sec	4.68	#DIV/0!	3.21	3.88		5.44	#DIV/0!	3.75	4.57
Froude Number Fr = V/ (g y)^0.5		1.06	#DIV/0!	0.76	0.84		1.24	#DIV/0!	0.89	0.99
Travel Time Tt (a) = Tt = L / (3600*V) (a)	hours	0.39	#DIV/0!	0.10	0.26		0.34	#DIV/0!	0.08	0.23
Total Flowpath Length	ft	8800	2300	2125	5950		8800	2300	2125	5950
Total Subbasin Tc	hours	1.26	0.41	0.50	0.85		0.69	0.30	0.32	0.57
Total Subbasin Tc	minutes	75	24	30	51		41	18	19	34
If Tc < 12 min, assume 12 min. = 0.2 hours	minutes	75	24	30	51		41	18	19	34
Lag Time Tlag = 0.6 Tc	minutes	45.3	14.6	17.9	30.5		24.8	10.8	11.6	20.4
Average Slope	ft/ft	2.63%	2.57%	1.24%	1.82%		1.77%	2.57%	1.16%	1.83%
Average Velocity (a)	ft./s	1.94	1.57	1.19	1.95		3.55	2.13	1.83	2.91
Subbasin ID		G_201A	G_201B	G_201C	G_201D		G_201A	G_201B	G_201C	G_201D

(a) Urban Hydrology for Small Watersheds (TR 55), June 1986 (see Chapt. 3).

(b) Measured from LIDAR data provided by SSCAFCA

The TR-55 Method allows for the sheet flow length to range from 100 ft. up to a maximum of 300 ft. For these computations, 300 ft was assumed to be standard for all subbasins in order to simplify the computations and to make the review process simple.

The TR-55 Method allows for the shallow concentrated flow length to range from 1600 ft. up to a maximum of 2000 ft. For these computations, 2000 ft was assumed to be standard for all subbasins in order to simplify the computations and to make the review process simple.

(c) NOAA Atlas 14 rainfall data.

(d) Open Channel Hydraulics (Chow, 1959).

(e) Part 630 Hydrology, National Engineering Handbook, Chapter 15 Time of Concentration, NRCS May 2010

Cells that have formulas.

HEC HMS Results Summary				
Existing Conditions				
	G_201A	G_201B	G_201C	G_201D
Q10	77.2	2.7	29.3	82.5
V10	16.4	0.2	3.6	13.6
Q50	186.6	5.5	72.9	200.5
V50	32.5	0.4	7.1	26.8
Q100	243.2	6.8	95.3	261.7
V100	40.1	0.5	8.7	33.0
Q500	418.2	10.5	163.7	448.7
V500	63.4	0.7	13.7	52.1
Ultimate Conditions				
	G_201A	G_201B	G_201C	G_201D
Q10	134.4	3.7	43.0	133.1
V10	18.9	0.3	4.2	16.4
Q50	286.4	6.1	91.6	284.5
V50	34.3	0.4	7.4	29.7
Q100	365.5	7.2	117.3	363.2
V100	41.4	0.5	8.9	35.8
Q500	609.6	10.7	196.3	601.5
V500	63.3	0.7	13.6	54.5

Project: Nightglow Simulation Run: EXISTING_10yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_EXISTIN
End of Run: 02Jun2023, 00:00 Meteorologic Model: 10-yr
Compute Time: 04May2023, 14:45:13 Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	77.2	01Jun2023, 07:00	16.4
G_201B	0.006094	2.7	01Jun2023, 06:20	0.2
G_201C	0.153281	29.3	01Jun2023, 06:30	3.6
G_201D	0.587188	82.5	01Jun2023, 06:45	13.6

Project: Nightglow Simulation Run: EXISTING_50yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_E
End of Run: 02Jun2023, 00:00 Meteorologic Model: 50-yr
Compute Time: DATA CHANGED, RECOMPUTE Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	186.6	01Jun2023, 07:00	32.5
G_201B	0.006094	5.5	01Jun2023, 06:20	0.4
G_201C	0.153281	72.9	01Jun2023, 06:25	7.1
G_201D	0.587188	200.5	01Jun2023, 06:40	26.8

Project: Nightglow Simulation Run: EXISTING_100yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_EXISTIN
End of Run: 02Jun2023, 00:00 Meteorologic Model: 100-yr
Compute Time: 04May2023, 15:15:17 Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	243.2	01Jun2023, 06:55	40.1
G_201B	0.006094	6.8	01Jun2023, 06:20	0.5
G_201C	0.153281	95.3	01Jun2023, 06:25	8.7
G_201D	0.587188	261.7	01Jun2023, 06:40	33.0

Project: Nightglow Simulation Run: EXISTING_500yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_E
End of Run: 02Jun2023, 00:00 Meteorologic Model: 500-yr
Compute Time: DATA CHANGED, RECOMPUTE Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	418.2	01Jun2023, 06:55	63.4
G_201B	0.006094	10.5	01Jun2023, 06:20	0.7
G_201C	0.153281	163.7	01Jun2023, 06:25	13.7
G_201D	0.587188	448.7	01Jun2023, 06:40	52.1

Project: Nightglow Simulation Run: ULTIMATE_10yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_ULTIMA
End of Run: 02Jun2023, 00:00 Meteorologic Model: 10-yr
Compute Time: 04May2023, 15:23:13 Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	134.4	01Jun2023, 06:35	18.9
G_201B	0.006094	3.7	01Jun2023, 06:15	0.3
G_201C	0.153281	43.0	01Jun2023, 06:15	4.2
G_201D	0.587188	133.1	01Jun2023, 06:30	16.4

Project: Nightglow Simulation Run: ULTIMATE_50yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_ULTIMA
End of Run: 02Jun2023, 00:00 Meteorologic Model: 50-yr
Compute Time: 04May2023, 15:24:31 Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	286.4	01Jun2023, 06:35	34.3
G_201B	0.006094	6.1	01Jun2023, 06:15	0.4
G_201C	0.153281	91.6	01Jun2023, 06:15	7.4
G_201D	0.587188	284.5	01Jun2023, 06:25	29.7

Project: Nightglow Simulation Run: ULTIMATE_100yr

Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_ULTIMA
End of Run: 02Jun2023, 00:00 Meteorologic Model: 100-yr
Compute Time: 04May2023, 15:33:39 Control Specifications: 24-hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	365.5	01Jun2023, 06:30	41.4
G_201B	0.006094	7.2	01Jun2023, 06:15	0.5
G_201C	0.153281	117.3	01Jun2023, 06:15	8.9
G_201D	0.587188	363.2	01Jun2023, 06:25	35.8

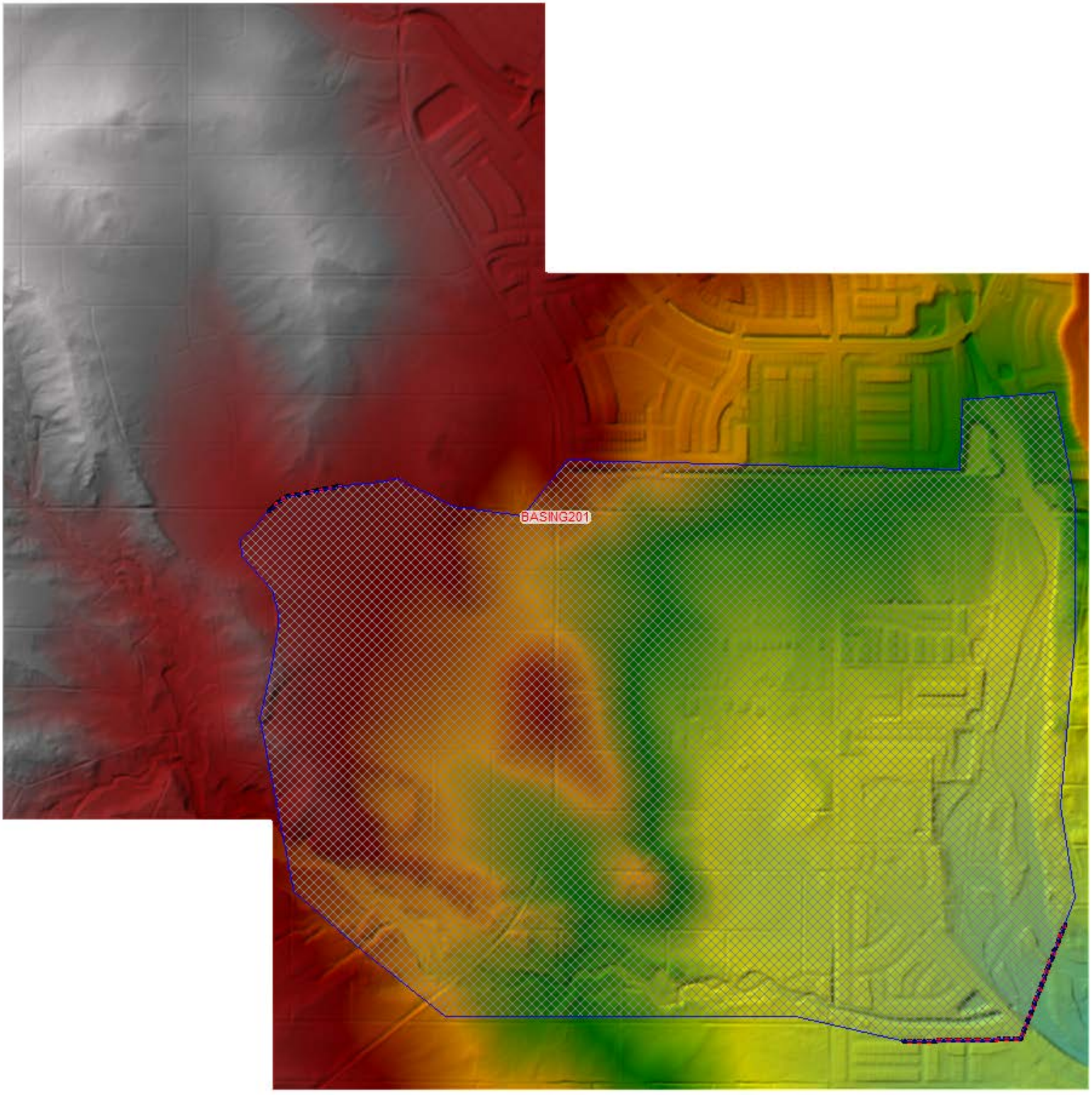
Project: Nightglow Simulation Run: ULTIMATE_500yr

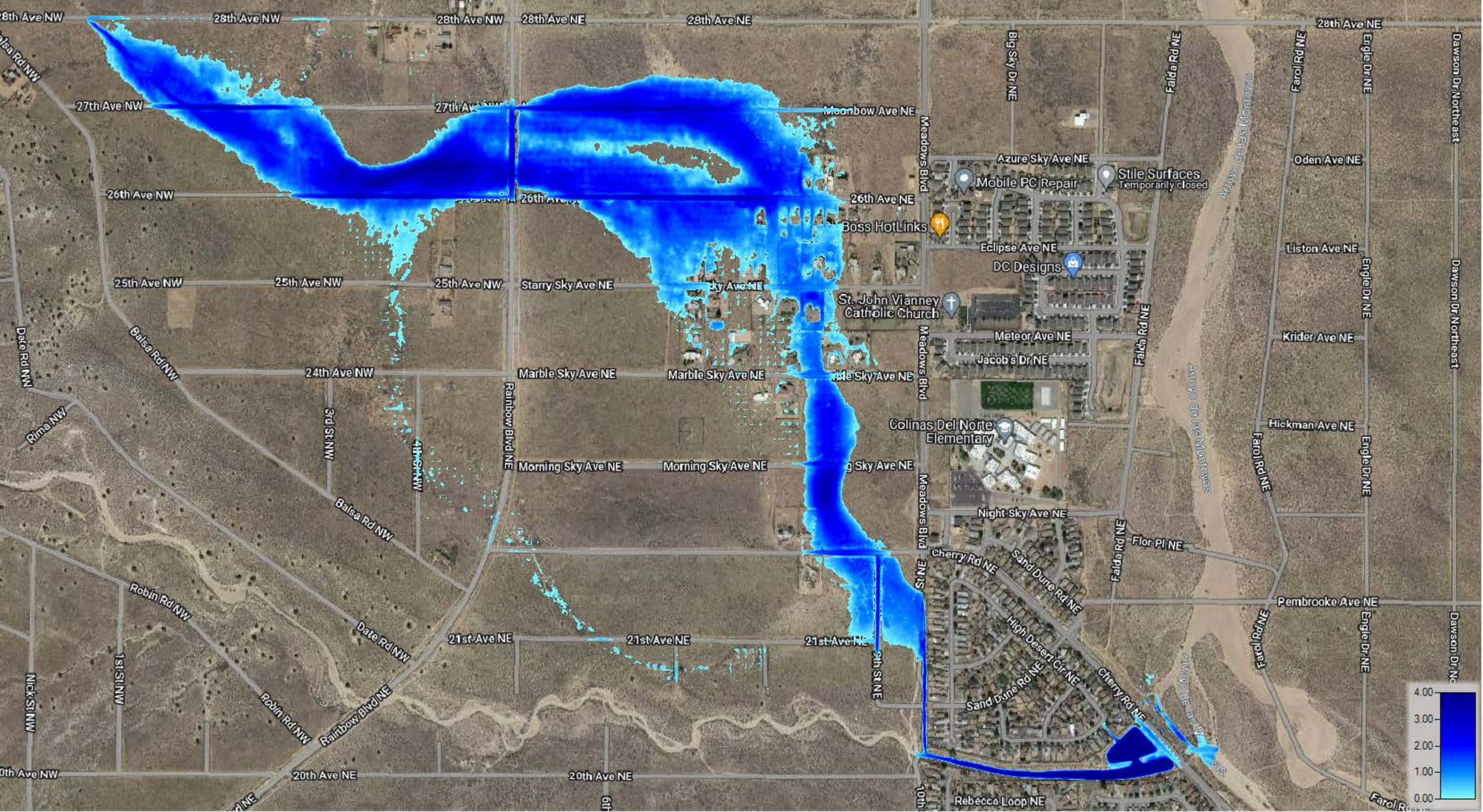
Start of Run: 01Jun2023, 00:00 Basin Model: Nightglow_ULTIMA
End of Run: 02Jun2023, 00:00 Meteorologic Model: 500-yr
Compute Time: 04May2023, 15:46:58 Control Specifications: 24-hour

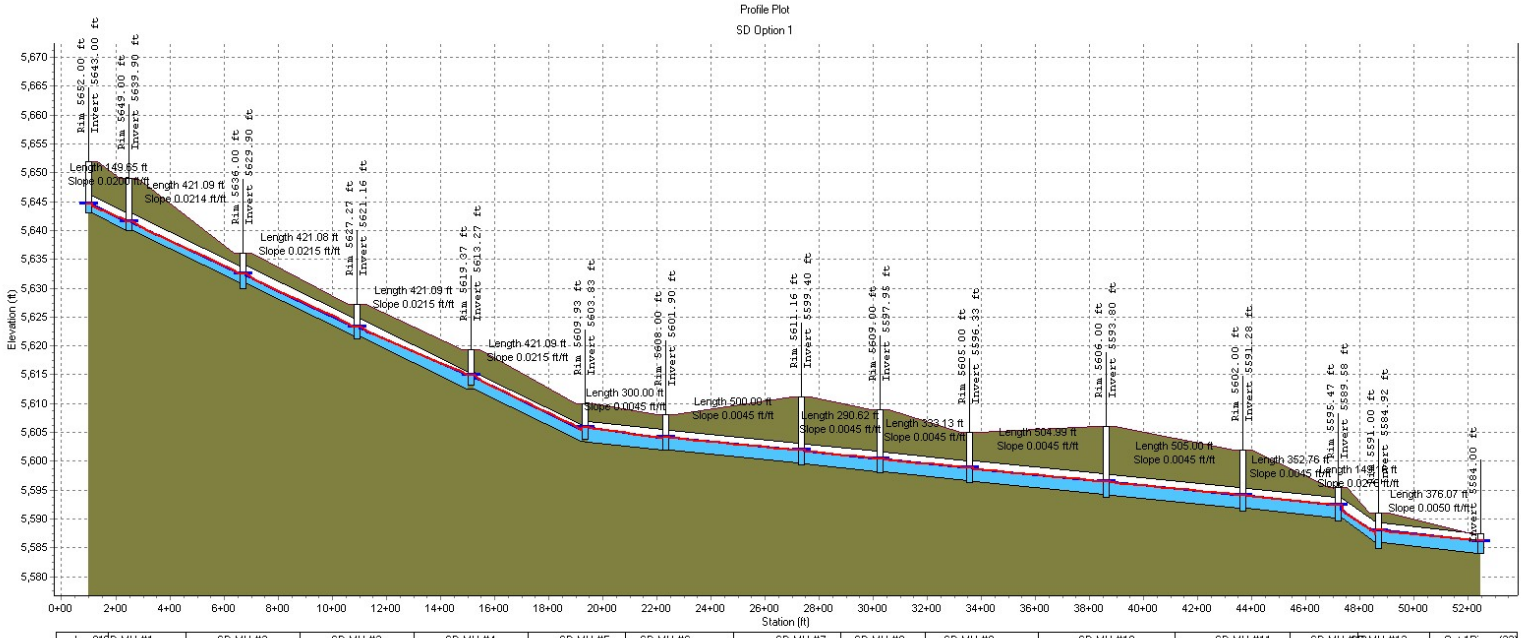
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
G_201A	0.720625	609.6	01Jun2023, 06:30	63.3
G_201B	0.006094	10.7	01Jun2023, 06:15	0.7
G_201C	0.153281	196.3	01Jun2023, 06:15	13.6
G_201D	0.587188	601.5	01Jun2023, 06:25	54.5

APPENDIX C: HYDRAULIC RESULTS

1. HEC-RAS Terrain Model
2. HEC-RAS Depth Results
3. Storm and Sanitary Analysis Profile – Alternative 2
4. Flow Master Calculation Worksheet – Alternative 3 Channel


BASING201


28th Ave NW
28th Ave NE
27th Ave NW
Moonbow Ave NE
26th Ave NW
26th Ave NE
25th Ave NW
Starry Sky Ave NE
24th Ave NW
Marble Sky Ave NE
Morning Sky Ave NE
21st Ave NE
20th Ave NE
Azure Sky Ave NE
Eclipse Ave NE
Meteor Ave NE
Jacob's Dr NE
Night Sky Ave NE
Cherry Rd NE
Sand Dune Rd NE
High Desert Cir NE
Flor Pl NE
Pembrooke Ave NE
Oden Ave NE
Liston Ave NE
Krider Ave NE
Hickman Ave NE
Rebecca Loop NE
Mobile PC Repair
Stile Surfaces
Temporarily closed
Boss HotLinks
DC Designs
St. John Vianney Catholic Church
Colinas Del Norte Elementary
Big Sky Dr NE
Meadows Blvd
Falda Rd NE
Farol Rd NE
Engle Dr NE
Dawson Dr Northeast
Arroyo de las Manzanas
Balsa Rd NW
Date Rd NW
Rima NW
Rainbow Blvd NE
3rd St NW
4th St NW
Robin Rd NW
1st St NW
Nick St NW
9th St NE
4.00
3.00
2.00
1.00
0.00



Node ID	Jun-01	SD MH #1	SD MH #2	SD MH #3	SD MH #4	SD MH #5	SD MH #6	SD MH #7	SD MH #8	SD MH #9	SD MH #10	SD MH #11	SD MH #12	SD MH #13	Out-1	Pipe - (32)
Rim (ft)	5652.00	5649.00	5636.00	5627.27	5619.37	5609.93	5608.00	5611.16	5609.00	5605.00	5606.00	5602.00	5595.47	5591.00		
Invert (ft)	5643.00	5639.90	5629.90	5621.16	5613.27	5603.83	5601.90	5599.40	5597.95	5596.33	5593.80	5591.28	5589.58	5584.92		5584.00
Min Pipe Cover (ft)	6.00	6.00	2.11	2.53	3.78	3.09	2.51	8.02	7.27	4.87	8.24	6.61	1.77	1.52		
Max HGL (ft)	5644.55	5641.68	5632.45	5623.26	5614.83	5605.86	5604.14	5601.88	5600.47	5598.87	5596.50	5594.13	5592.44	5588.04		5586.16

Link ID	Link-03	Pipe - (20)	Pipe - (21)	Pipe - (22)	Pipe - (23)	Pipe - (24)	Pipe - (25)	Pipe - (26)	Pipe - (27)	Pipe - (28)	Pipe - (29)	Pipe - (30)	Pipe - (31)	Pipe - (32)
Length (ft)	149.65	421.09	421.08	421.09	421.09	300.00	500.00	290.62	333.13	504.99	505.00	352.76	149.16	376.07
Dia (in)	36.00	36.00	36.00	36.00	36.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
Slope (ft/ft)	0.0200	0.0214	0.0215	0.0215	0.0215	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0276	0.0050
Up Invert (ft)	5643.00	5639.90	5630.79	5621.64	5612.49	5603.34	5601.89	5599.54	5598.13	5596.53	5594.16	5591.79	5590.10	5585.88
Dn Invert (ft)	5640.00	5630.89	5621.74	5612.59	5603.44	5601.99	5599.64	5598.23	5596.63	5594.26	5591.89	5590.20	5585.98	5584.00
Max Q (cfs)	56.95	52.31	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Max Vel (ft/s)	14.66	14.50	13.97	13.50	14.13	8.67	7.69	7.69	7.68	7.68	7.68	7.68	15.17	8.00
Max Depth (ft)	1.55	1.52	1.52	1.56	1.50	2.03	2.24	2.24	2.24	2.24	2.24	2.24	1.31	2.16

Alternative 3 - Channel

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	10.00	ft

Results

Discharge	75.51	ft^3/s
Flow Area	24.00	ft^2
Wetted Perimeter	22.37	ft
Hydraulic Radius	1.07	ft
Top Width	22.00	ft
Critical Depth	1.04	ft
Critical Slope	0.01953	ft/ft
Velocity	3.15	ft/s
Velocity Head	0.15	ft
Specific Energy	1.65	ft
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.04	ft
Channel Slope	0.00500	ft/ft

Alternative 3 - Channel

GVF Output Data

Critical Slope	0.01953	ft/ft

APPENDIX D: MISCELLANEOUS

1. FEMA Firm Panel 35043C1900D
2. Approved Jurisdictional Determination

NOTES TO USERS

ap is for use in administering the National Flood Insurance Program. It ot necessarily identify all areas subject to flooding, particularly from local e sources of small size. The **community map repository** should be ed for possible updated or additional flood hazard information.

ain more detailed information in areas where **Base Flood Elevations** and/or **floodways** have been determined, users are encouraged to consult od Profiles and Floodway Data and/or Summary of Stillwater Elevations contained within the Flood Insurance Study (FIS) report that accompanies RM. Users should be aware that BFEs shown on the FIRM represent l whole-foot elevations. These BFEs are intended for flood insurance urposes only and should not be used as the sole source of flood elevation tion. Accordingly, flood elevation data presented in the FIS report should ed in conjunction with the FIRM for purposes of construction and/or ain management.

l Base Flood Elevations shown on this map apply only landward of 0.0' merican Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be hat coastal flood elevations are also provided in the Summary of Stillwater ns table in the Flood Insurance Study report for this jurisdiction. Elevations in the Summary of Stillwater Elevations table should be used for ction and/or floodplain management purposes when they are higher than ations shown on this FIRM.

ries of the **floodways** were computed at cross sections and interpolated n cross sections. The floodways were based on hydraulic considerations gard to requirements of the National Flood Insurance Program. Floodway and other pertinent floodway data are provided in the Flood Insurance eport for this jurisdiction.

areas not in Special Hazard Areas may be protected by **flood structures**. Refer to Section 2.4 "Flood Protection Measures" of the nsurance Study report for information on flood control structures for this ion.

ojection used in the preparation of this New Mexico State Plane, zone. The **horizontal datum** was NAD 83, GRS80 spheroid. ces in datum, spheroid, projection or State Plane zones used in the ion of FIRMs for adjacent jurisdictions may result in slight positional ces in map features across jurisdiction boundaries. These differences do ct the accuracy of this FIRM.

levations on this map are referenced to the North American Vertical of 1988. These flood elevations must be compared to structure and elevations referenced to the same **vertical datum**. For information ng conversion between the National Geodetic Vertical Datum of 1929 North American Vertical Datum of 1988, visit the National Geodetic Survey at http://www.ngs.noaa.gov or contact the National Geodetic Survey llowing address:

formation Services
N/NGS 12
l Geodetic Survey SSMC-3, #9202
ast-West Highway
pring, Maryland 20910-3282
13-3242

ain current elevation, description, and/or location information for **bench** shown on this map, please contact the Information Services Branch of the l Geodetic Survey at **(301) 713-3242**, or visit its website at ww.ngs.noaa.gov.

ap information shown on this FIRM was derived from U.S. Geological Digital Orthophoto Quadrangles at a scale of 1:12,000 from photography 996 or later, and from Bohannan Huston Inc. at a scale of 1:12,000 otography dated 2003 or later.

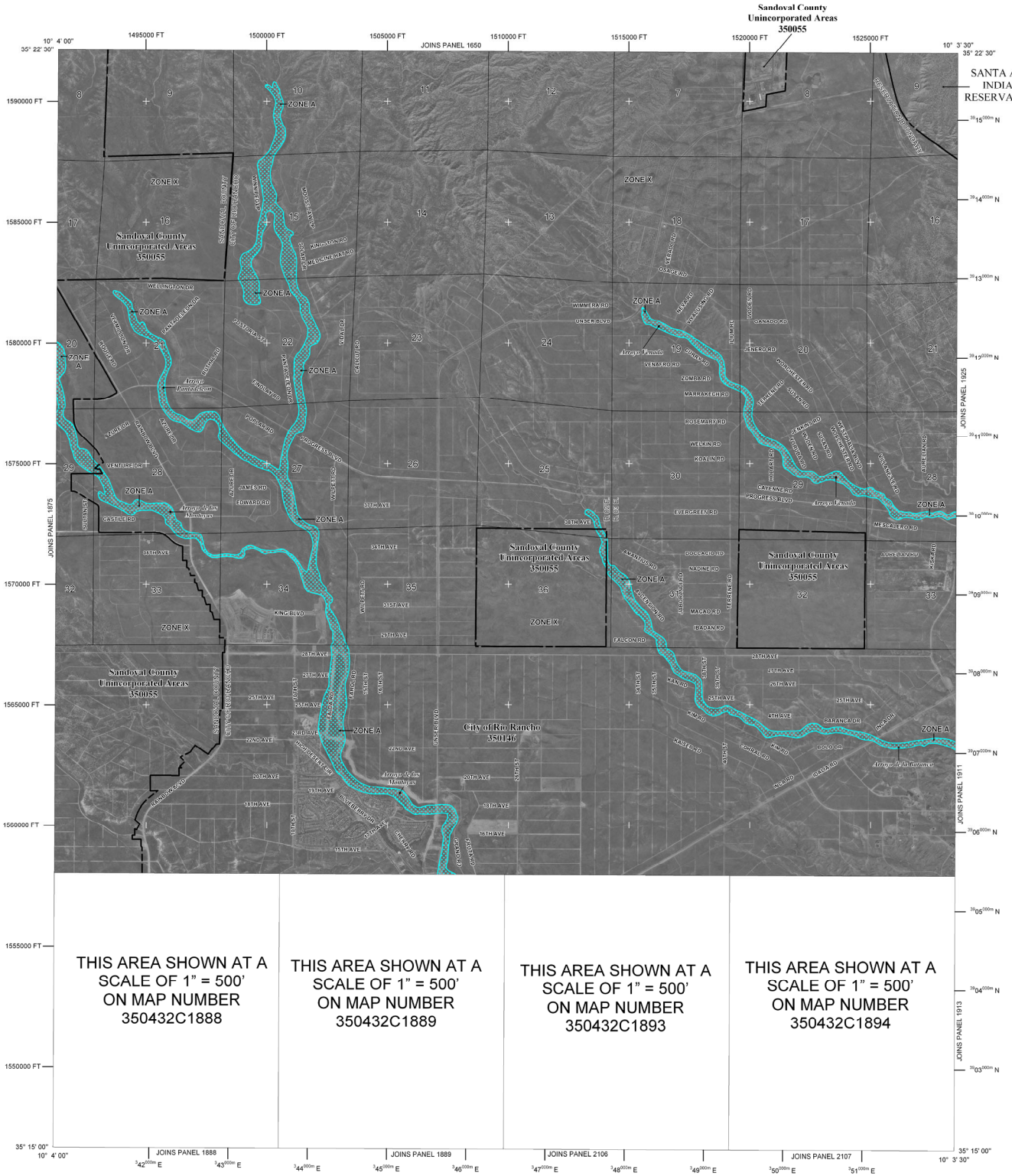
ap reflects more detailed and up-to-date **stream channel configurations** ose shown on the previous FIRM for this jurisdiction. The floodplains and ys that were transferred from the previous FIRM may have been adjusted orm to these new stream channel configurations. As a result, the Flood and Floodway Data tables in the Flood Insurance Study report (which s authoritative hydraulic data) may reflect stream channel distances that om what is shown on this map.

ate limits shown on this map are based on the best data available at the publication. Because changes due to annexations or de-annexations may curred after this map was published, map users should contact appropriate nity officials to verify current corporate limit locations.

refer to the separately printed **Map Index** for an overview map of the showing the layout of map panels; community map repository addresses; isting of Communities table containing National Flood Insurance Program or each community as well as a listing of the panels on which each nity is located.

the **FEMA Map Service Center** at 1-800-358-9616 for information on e products associated with this FIRM. Available products may include sly issued Letters of Map Change, a Flood Insurance Study report, and/or ersions of this map. The FEMA Map Service Center may also be reached at 1-800-358-9620 and its website at http://www.msc.fema.gov.

ave **questions about this map** or questions concerning the National Flood e Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJ
INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that chance of being equaled or exceeded in any given year. The Special Flood Hazard A area subject to flooding by the 1% annual chance flood. Areas of Special Flood Haza Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the wate elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); B Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain depths determined. For areas of alluvial fan flooding, velo determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% ann flood by a flood control system that was subsequently decertified indicates that the former flood control system is being restored protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Fed protection system under construction; no Base Flood El determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no B Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); B Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must b of encroachment so that the 1% annual chance flood can be carried without substantia in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance average depths of less than 1 foot or with drainage areas le square mile, and areas protected by levees from 1% annual chan

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodpla

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREA

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard A

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of diffe Flood Elevations, flood depths or flood velocities.

513 Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; in feet*

* Referenced to the North American Vertical Datum of 1988

A 23 Cross section line

23 Transect line

87°07'45", 32°22'30" Geographic coordinates referenced to the North Ameri of 1983 (NAD 83)

4276000m 1000-meter Universal Transverse Mercator grid values,

600000 FT 5000-foot grid ticks: New Mexico State Plane co system, Central zone (FIPSZONE 3002), Transverse M projection

DX5510 × Bench mark (see explanation in Notes to Users sect FIRM panel)

M1.5 River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
July 16, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 18, 2008 - to update map format.

For community map revision history prior to countywide mapping, refer to the Comm History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance a the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1900D

FIRM

FLOOD INSURANCE RATE M

SANDOVAL COUNTY
NEW MEXICO
AND INCORPORATED AR

PANEL 1900 OF 2225

(SEE MAP INDEX FOR FIRM PANEL L

CONTAINS:

COMMUNITY	NUMBER	PANEL
RIO RANCHO, CITY OF	350146	1900
SANDOVAL COUNTY UNINCORPORATED AREAS	350055	1900

Notice to User. The **Map Number** shown belo used when placing map orders; the **Communi** shown above should be used on insurance appl the subject community.

MAP NU
35043C

MAP RE
MARCH 1

Federal Emergency Management

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT
4101 JEFFERSON PLAZA NE
ALBUQUERQUE, NM 87109

November 19, 2020

Regulatory Division

SUBJECT: No Permit Required – Action Number (No.) SPA-2020-00208, Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) Bank Stabilization Project in the Montoyas Arroyo Location 3; Request for an Approved Jurisdictional Determination (AJD)

David Gatterman
SSCAFCA
1041 Commercial Drive SE
Rio Rancho, NM 87124

Dear Mr. Gatterman:

This letter responds to your request for a determination of Department of the Army (DA) permitting requirements for your proposed bank stabilization project for property located within the Montoyas Arroyo (Location 3) at approximately latitude 35.289756°, longitude -106.662665°, in Sandoval County, New Mexico. On August 8, 2020 SSCAFCA requested that the U.S. Army Corps of Engineers (Corps) process an AJD for the proposed project site. We have assigned Action No. SPA-2020-00208 to your request. Please reference this number in all future correspondence concerning the site.

Based on the information provided by SSCAFCA and obtained by the Corps, we have determined that a DA permit is not required since the project would not result in the discharge of dredged/fill material into waters of the United States. This decision is based on the requested AJD, which determined that there are no waters of the United States within the review area (attached). The basis for the AJD is that the project site is located within an ephemeral stream channel, which is excluded from regulation under the Navigable Waters Protection Rule (i.e. Exclusion (b)(3) Ephemeral feature - including an ephemeral stream, swale, gully, rill, or pool). A copy of this AJD is also available at http://www.spa.usace.army.mil/reg/JD. The AJD is valid for five years unless new information warrants revision of the determination before the expiration date.

The delineation included herein has been conducted to identify the location and extent of the aquatic resource boundaries and/or the jurisdictional status of aquatic resources for purposes of the Clean Water Act for the particular site identified in this request. This delineation and/or jurisdictional determination may not be valid for the Wetland Conservation Provisions of the Food Security Act of 1985, as amended. If you

or your tenant are USDA program participants, or anticipate participation in USDA programs, you should discuss the applicability of a certified wetland determination with the local USDA service center, prior to starting work."

You may accept or appeal this AJD or provide new information in accordance with the attached Notification of Administration Appeal Options and Process and Request for Appeal (NAAOP-RFA). If you elect to appeal this AJD, you must complete Section II of the form and return it to the Army Engineer Division, South Pacific, CESPD-PDS-O, Attn: Tom Cavanaugh, Administrative Appeal Review Officer, P.O. Box 36023, 450 Golden Gate Ave, San Francisco, CA 94102 within 60 days of the date of this notice. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

It should be noted that it is incumbent upon you to remain informed of any changes in regulations and policies as they relate to your project. If your plans change such that waters of the U.S. could be impacted by the proposed project, please contact our office for a re-evaluation of permitting requirements.

If you have any questions concerning our regulatory program, please contact Forrest Luna at (505) 342-3678 or by e-mail at Forrest.Luna@usace.army.mil.

At your convenience, please complete a Customer Service Survey on-line available at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Sincerely,

Forrest Luna
Regulatory Project Manager
Regulatory Division

Enclosure(s)

1. AJD Form
2. Appeal Form