Doña Ana Flood Commission
La Union Area Drainage Master Plan
Final Report

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LARKIN GROUP AMG INC
8500 Menaul Blvd. NE Suite A-440
Albuquerque, NM 87112
Phone: 505-275-7500 Fax: 505-275-0748
email: albmail@larkin-grp.com

TABLE OF CONTENTS

I. Introduction 1
II. Background Information 2
II.1 Previous Studies 2
II.2 Existing Conditions 2
II.3 Purpose and Need 3
III. Environmental Issues 3
III.1 Soils 3
III.2 Paleontology 3
III.3 Historic Sites 3
III.4 Threatened or Endangered Species 3
III.5 Wetlands 4
III.6 Air Quality 4
III.7 Water Quality 4
III.8 Floodplains 4
III.9 Socioeconomics 4
III.10 Environmental Justice 4
IV. Public Input 4
V. Hydrologic Analysis & Methodology 5
V.1 Climate 5
V.2 Rainfall Data 5
V.3 Topographic Mapping 7
V.4 Soil Data and Conditions 7
V.5 Numerical Models and Methodology 10
V.6 Hydrologic Analysis Results 11
VI. Hydraulic Analysis & Methodology 13
VI.1 Numerical Models and Methodology 13
VII. Study Results 13
VIII. Elephant Butte Irrigation District West Drain 13
IX. Storm Water Quality 14
X. Consideration of Alternatives and Recommendations 14
XI. Recommendations 18
XII. Bibliography, References & Special Thanks 27

Figures

Figure 1Vicinity Map 1
Figure 2 Public Input Summary 6
Figure 3 Type II-75 Distribution 7
Figure 4 Soils Map 9
Figure 5 Existing Hydrology 12
Figure 6 Possible Ponding Locations 16
Figure 7 Proposed Hydrology Option 1 19
Figure 8 Proposed Hydrology Option 2 20
Figure 9 Single Dam Preliminary Channel & Dam Option 2 21
Figure 10 Single Dam Preliminary Plan & Profile Option 2 22
Figure 11 Alternative Dams Layout Option 1 23
Figure 12 Preliminary Street Flow Capacities 24
Figure 13 Proposed Street Improvements One Dam Option 25
Figure 14 Proposed Street Improvements Two Dam Option 26

Tables

Table 1 December 5th, 2012 Public Input Summary 5
Table 2 Average Annual Climatic Data for Las Cruces, NM and El Paso, TX 5
Table 3 NRCS Soil Groups Within Study Area 8
Table 4 NRCS Soil Groups With Curve Numbers 10
Table 5 Existing Hydrologic Analysis Input Parameters 11
Table 6 Existing Hydrologic Analysis Summary 11
Table 7 Study Summary 13

Appendices

APPENDIX A: FIRM
APPENDIX B: DESKTOP ENVIRONMENTAL REVIEW
APPENDIX C: PUBLIC COMMENT
APPENDIX D: HYDROLOGY
APPENDIX E: SOILS
APPENDIX F: HYDRAULIC ANALYSIS
APPENDIX G: COST ESTIMATES
APPENDIX H: COMPACT DISK WITH COMPUTER MODELS

Map Pocket

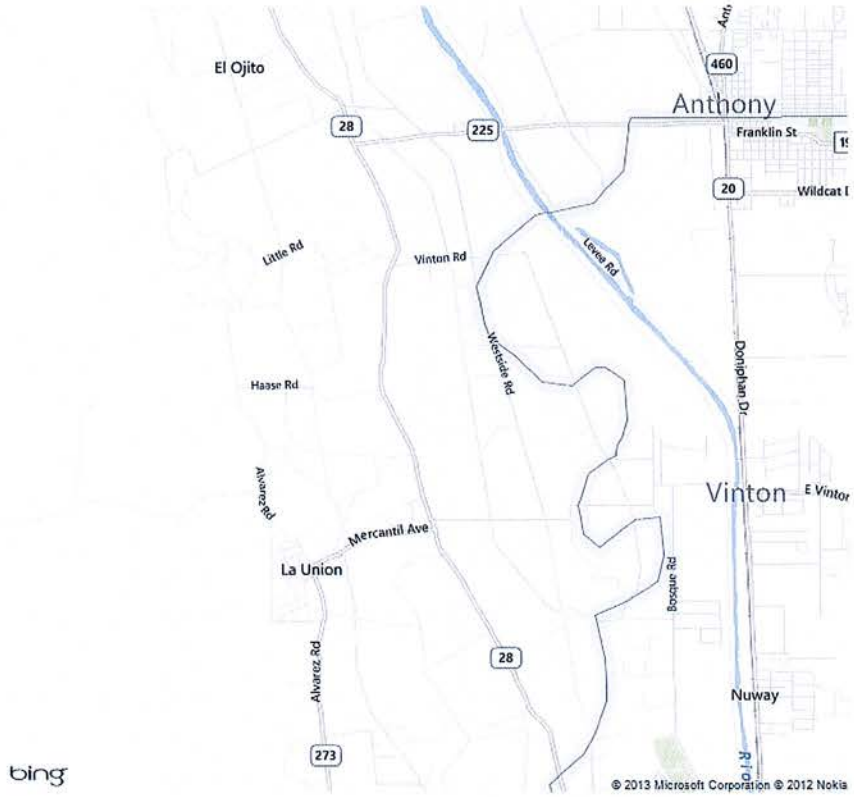
Plate 2 La Union Drainage Master Plan Public Input Summary

I. Introduction

The Townsite of La Union (See Figure 1) rests on the lower slopes of the Rio Grande Valley immediately adjacent to the west side of the Rio Grande floodplain. Historically, water from the uplands to the west has flowed through this settlement toward the Rio Grande to the east.

The Doña Ana County Flood Commission, realizing there are drainage issues in the Townsite of La Union which need to be addressed, has authorized Larkin Group NM, Inc. (Larkin) to prepare this La Union Area Drainage Master Plan.

Figure 1 Vicinity Map



This Drainage Master Plan will quantify the storm water runoff affecting the La Union area, present preliminary solutions to address the drainage issues and serve as an aide in acquiring funding, prioritizing and planning for future construction projects. The process for this work includes hydrologic studies of the drainage area tributary to the vicinity of La Union; hydraulic analysis of proposed alternatives, including a no-build plan; seeking public input; preparing cost estimates; and developing a master plan for the drainage of the La Union area. This report presents a narrative of the work performed and the results of this study.

II. Background Information

Approximately 300 people live in the immediate La Union Townsite. The development of the Townsite dates from1852 when the lands of the Refugio de los Amoles were granted to the inhabitants by the Mexican government. The government found that these lands had been inhabited and improved by the residents, mostly natives of either Mexico or New Mexico, who had settled the land for its agricultural value. However, the Gadsden Purchase in 1854 placed these lands within the borders of the United States and began a lengthy court battle in which the residents sought to retain their ownership of the granted lands. The final settlement in 1928 allowed the valley residents to retain ownership of the land. Many descendants of those original settlers still reside in La Union and the surrounding area.

Some settlements in the valley east of La Union were destroyed by flooding of the Rio Grande. The construction of the Elephant Butte Dam and the Caballo Dam removed most of the flood threat from the Rio Grande. However, flows from the high deserts to the west continue to cause infrequent, but serious flooding in the area. In addition, flows from the immediate area cause frequent nuisance flooding accompanied by erosion and siltation of the very fine granular soils of the area.

II.1 Previous Studies

The Federal Emergency Management Agency's (FEMA) "Flood Insurance Study Doña Ana County, New Mexico and Incorporated Areas" dated September 6, 1995 was reviewed for this report. A reduced size copy of the current Flood Insurance Rate Map (FIRM) Panel 925 of 1050 (effective September 27, 1991) is included in Appendix A. This FIRM panel shows the north portion of the Townsite in a Special Flood Hazard Area Inundated by 100-year Flood Zone A with no base flood elevations determined.

II.2 Existing Conditions

The present Townsite of La Union is home to approximately 300 residents. The Townsite occupies the lower slopes of the valley immediately west of the Rio Grande floodplain. Nearly all of the area surrounding the Townsite is used for agricultural purposes. The valley floor to the east is heavily farmed, while the higher land to the west is composed of cattle ranches and Federal Lands operated by the Bureau of Land Management (BLM). Much of this land is also used for cattle grazing.

Financed by funds from the Colonias Act, water and sewer systems were constructed in the Townsite. The sewer system is owned by La Union and operated by Doña Ana County while the water system is owned and operated by the La Union Mutual Domestic Sewer & Water Association. A part of the goal of this study is to develop alternatives that interfere as little as possible with these existing systems.

Although La Union is not incorporated, it has organized a governing board similar to those found in villages in New Mexico. This organization and the strong participation of the Board members will aid the Townsite in applying for and qualifying for grants and loans to assist in funding needed improvements.

At present flood flows are mostly discharged to farmland to the east. Some flows probably reach the West Drain operated by the Elephant Butte Irrigation District (EBID). The West Drain is the only viable discharge point for drainage facilities that may be constructed. However, because it has limited capacity, peak flows must be attenuated prior to release to the drain. Water quality standards established for discharge from the drain to the Rio Grande will also require that care be taken to assure EBID the water discharged to the drain at least meets these standards.

II.3 Purpose and Need

Because of its geographical location in the lower slopes of the Rio Grande Valley, La Union is subject to flood flows not only from within the Townsite, but during larger storms substantial flows can be generated in the higher lands to the west that also pass though the Townsite. These large storms present a very real danger of damage within the Townsite as well as possible injury to the residents. Even the smaller rains cause substantial damage from the erosion and deposition of the very fine sandy soils of the area.

For these reasons, it is important that this historic Townsite be protected from damage and danger of flooding, by the construction of suitable flood control facilities.

III. Environmental Issues

As part of this study, Larkin commissioned Zia Engineering and Environmental Consultants, LLC (Zia) to prepare a Desktop Environmental Review of the Townsite of La Union. This review is a very preliminary overview of potential environmental issues that may need to be faced if construction projects are initiated. A copy of Zia's review is included as Appendix B. From this overview it appears that the most likely environmental concerns will be caused by prime farmland and historic buildings. These and other concerns will require coordination with the appropriate governmental agencies during the development of drainage improvements projects. This document was prepared from online or printed resources. No field surveys were made and no attempts were made to consult with interested governmental agencies. A summary of the findings follows.

III.1 Soils

Because of the occurrence of Farmland Soils of Statewide Importance in the La Union area, coordination with the National Resource Conservation Service (NRCS) is recommended. NRCS will provide recommendations if soils deemed to be of Statewide Importance are encountered.

III.2 Paleontology

Areas of high concentrations of resources are mainly in the high desert areas west of the Townsite. If BLM land is used for construction, early coordination is advised. One site has been documented within one mile of the Townsite, but subsequent studies were not able to locate it. The potential for archeological sites in La Union is low.

III.3 Historic Sites

The Little La Union Lateral and the West Drain, as part of the EBID system, are on the National Record. There are approximately 95 houses within La Union that may be eligible for listing. Coordination with the State Historic Preservation Office (SHPO) will be required during any construction within 50 feet of any of these houses.

III.4 Threatened or Endangered Species

The project area contains habitat suitable for two plant, one insect, one reptile, three bird, and one mammal species listed as Threatened or Endangered Species (TSE) that may occur in Doña Ana County. Additionally, Doña Ana County does not contain designated critical habitat for any TSE. Biologic surveys should be made during project design and appropriate coordination carried out with State and Federal agencies.

III.5 Wetlands

Three areas of fresh water ponds are found in the area. It appears the project can be feasibly completed without disturbing these areas or any known wetlands.

III.6 Air Quality

Occasional instances of non-attainment of air quality standards have occurred in the area. Consultation with the New Mexico Environment Department (NMED) Air Quality Bureau is advised.

III.7 Water Quality

La Union is located within the Mesilla Bolson of the Rio Grande aquifer. Groundwater is generally unconfined and typically moves southward at an average gradient of about 4 to 6 feet/mile. The water table is approximately 10 to 25 feet below the surface in much of the valley-floor area. Construction should be planned to conform to the requirements of NMED Ground Water Quality Bureau and Surface Water Quality Bureau as well as Environmental Protection Agency (EPA) requirements regarding construction activities.

III.8 Floodplains

Most of La Union is designated as Zone X, areas outside the 500-year floodplain or Zone A, areas within the 100-year floodplain with no base flood elevation determined. Regardless of project sponsorship, coordination with the Doña Ana County Flood Commission concerning impacts to existing floodplains is advised.

III.9 Socioeconomics

According to the EPA Environmental Justice Mapper, the population of La Union is between 40% and 100% minority and 10% to 20% are considered in poverty. Project planning should not negatively impact livelihood, and the final outcome of the project should not be to the financial detriment of the Townsite.

III.10 Environmental Justice

According to the Environmental Justice Mapper, hazardous materials are not present within one mile of La Union. Construction and equipment should prevent leakage of oil and hydraulic fluids.

IV. Public Input

During the course of this study two Public Meetings were held for the residents of the La Union area.

The first Public Meeting held on December 5th of 2012 Larkin and Doña Ana County Flood Commission staff conducted a public meeting for input from residents in the La Union area. Approximately 16 area residents attended the meeting and shared photos of the conditions they had to deal with after recent storms (See Appendix C). Larkin provided aerial mapping of the area divided into four large-scale exhibits. The public was then invited to place red dots on the exhibits and describe drainage problems they have experienced.

This process identified many concerns and identified drainage problem areas associated with these concerns, the residents are experiencing during almost every rainfall event. These problems include, but are not limited to, ponding areas (one area causing traffic to seek an alternate route), excessive street flows, sediment deposition, and erosion along roadways. See Table 1 for comment summaries and Figure 2 for a reduced size area photograph with problem areas identified. An additional, larger plot is also provided in the Map Pocket.

Table 1 December 5th, 2012 Public Input Summary

Location	Problem	Location	Problem	Location	Problem
Alvarez @ Visnaga	Flooding	Rosales @ Salome	Flows	Alvarez @ Paloma	Flooding
Salome & La Union	Flooding	Mercantile @ Salome	Erosion	S. Alvarez	Ponding
Sentenario & San Antonio	Flooding	Mercantile @ La Union	Flooding	Golondrina @ Alvarez	Ponding
Salome & Paloma	Flooding	Mercantile @ La Union	Ponding	Mercantile @ Sentenario	High Flows
Along Mercantile	Erosion	Aguila Ave	Ponding	Alvarez @ Visnaga	Ponding
Mercantile & Sentenario	Ponding	Alvarez Rd	Flooding	Sentenario	Ponding
Mercantile & Alvarez	Erosion	Mercantile @ La Union	Ponding	Aguila	Ponding
Alvarez & Visnaga	Ponding	Salome @ La Union	Ponding	Mercantile @ La Union	Ponding
Salome @ Paloma	Ponding	Sentenario @ San Antonio	Ponding	Paloma	Ponding

The second Public Meeting, held on April 17, 2013 presented the results and recommendations of the study and provided an opportunity for the residents of La Union to comment on the proposed projects.

V. Hydrologic Analysis & Methodology

This study analyzed the area for the 10-year (10% probability) and 100-year (1% probability) 24-hour storm events. Both storm events were modeled with Type II and Type III antecedent moisture conditions, using the Type 2-75 storm distribution (See Appendix D). Also for the purpose of this study, the effects of the two existing dams known as La Union Dam A and La Union Dam B (See Existing Hydrology Map) were not included in the hydrologic or hydraulic analysis.

V.1 Climate

The geographic area is characterized by semiarid climate (See Table 2). As the site is located between Las Cruces, NM and El Paso, TX, the published climate data (www. Wrcc.dri.edu) for both cities has been included for informational purposes.

Table 2 Average Annual Climatic Data for Las Cruces, NM and El Paso, TX

Item	Las Cruces	El Paso
Avg. Maximum Temperature	79°F	77°F
Avg. Minimum Temperature	46°F	49°F
Daily Mean Temperature	56.8°F	63°F
Avg. Annual Precipitation	6.3 inches	8.8 inches

V.2 Rainfall Data

Rainfall depths of 2.38 inches for the 10-year 24-hour event and 3.72 inches for the 100-year 24-hour event were used for this study. These depths were determined using the recently published NOAA Atlas 14, which is available on the Internet in an interactive data extraction format (http://hdsc.nws.noaa.gov/hdsc/pfds). NOAA 14 (See Appendix D) was prepared by the National Weather Service to replace NOAA Atlas 2.

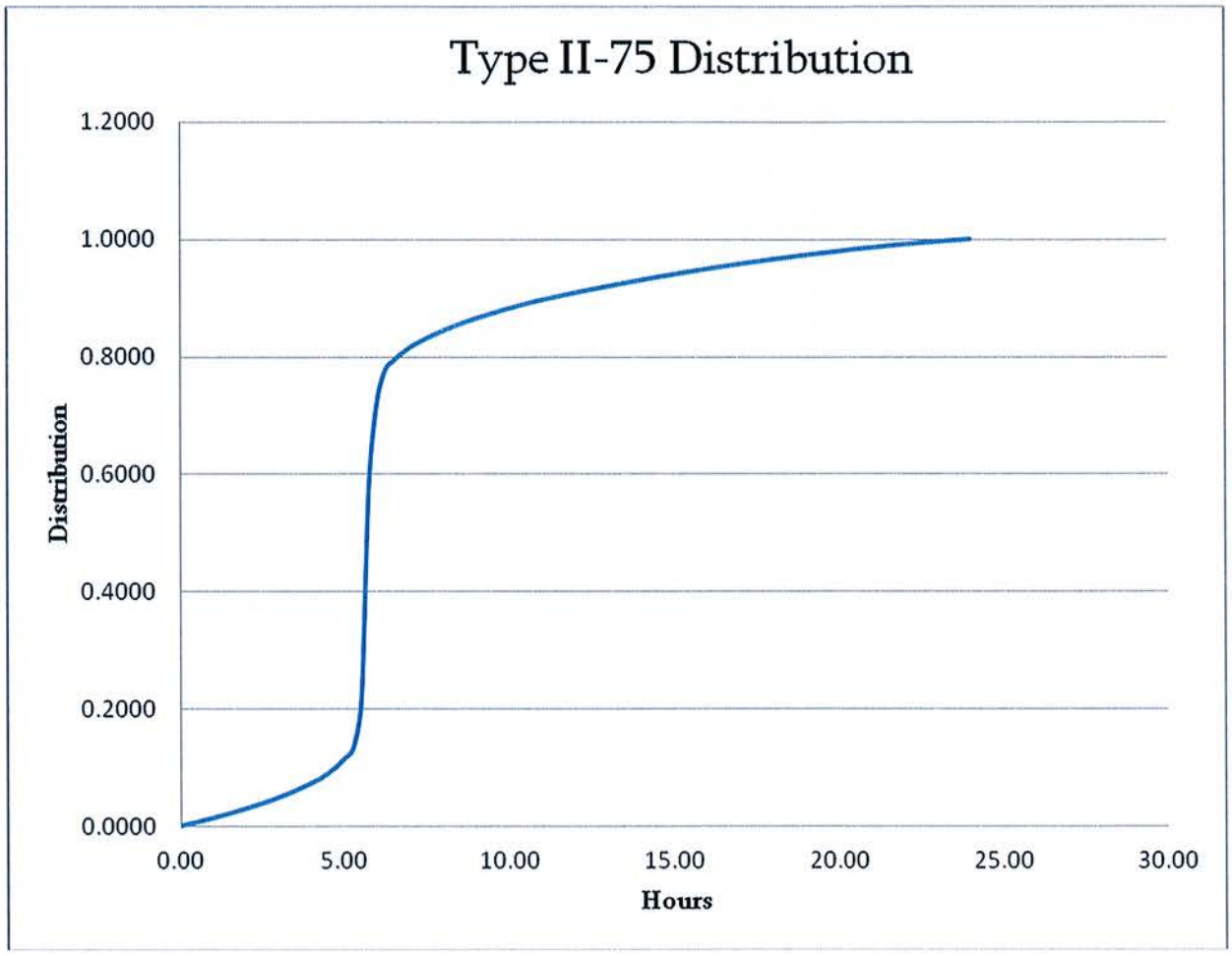
Put Public Input Summary Here

Figure 2 Public Input Summary

V.2a Rainfall Distribution

The Type II-75 storm distribution (See Figure 3) as developed by the NRCS specifically for modeling storm events in southern New Mexico was applied to the point precipitation values for both the 10-year and 100-year events. This distribution places the storm's peak at approximately 6 hours with 75% of the total precipitation falling in 1 hour surrounding the peak.

Figure 3 Type II-75 Distribution



V.3 Topographic Mapping

Two-foot interval topographic mapping for the project site originated from 2010 digital aerial photography and LiDAR mapping provided by the Doña Ana County Flood Commission. The mapping was prepared using New Mexico State Plane Coordinate System-Central Zone and based on the North American Vertical Datum of 1983. A field inspection was conducted in December 2012 by Larkin personnel in order to catalog existing field conditions and key terrain features that impact the storm flows and their courses.

V.4 Soil Data and Conditions

Soils within the watershed were identified from surface samples and observations using geographic information system (GIS) capabilities and the digital NRCS Soil Survey Geographic Database (SURRGO).

V.4a Soil Groups

Although the aerial extent of specific soil units was derived from GIS data, soil type is typically derived from the NRCS soil surveys. These surveys classify soils into one of four "hydrologic soil groups;" A, B, C or D. Type A soils have a very low runoff potential and are typically very porous soils such as sandy and cobbly soils. Type D soils are soils which have a high runoff potential such as very rocky soils, soils with a well developed desert pavement or soils with a shallow impervious layer. Soils for this study were identified using the NRCS soil survey of Doña Ana County (NRCS, 1977) and the NRCS website for Doña Ana County (NRCS, 2007). The data includes a description of each major association and its characteristics and hydrologic soil group. The majority of the study area is comprised of soils that are within hydrologic soil groups A and B. A summary of the soils in the study area is provided below in Table 3, with detailed descriptions in Appendix E. Figure 4 is a soils map of the study area.

Table 3 NRCS Soil Groups Within Study Area

Soil Symbol	Map Unit Name	Hydrologic Soil Group
Bm	Bluepoint loamy sand, 1 to 5% slopes	A
Bn	Bluepoint loamy sand, 5 to 15% slopes	A
BP	Bluepoint-Caliza-Yturbide complex	A
Gf	Glendale clay loam	B
Pa	Pajarito fine sandy loam	B
RF	Riverwash-Arizo complex	A
SH	Simona-Harrisburg association	D
WP	Wink-Pintura complex	B

V.4b Antecedent Moisture Content

One factor that impacts the curve number estimate is relative soil moisture content. This factor is described by the NRCS using a relative term of "antecedent moisture condition" (AMC). The NRCS has identified three different antecedent moisture conditions; AMC I, AMC II, and AMC III. AMC I is a condition in which the soil moisture has been depleted by a relatively long period of no rainfall and is assumed to represent the condition when the soil has its highest infiltration rate. AMC II is an average condition and is the condition usually assumed to be present in the watershed for most hydrologic studies for drainage design. AMC III is the condition in which soil moisture is high due to recent rainfall or snowmelt. This condition is assumed to be the condition in which the soil infiltration capacity is at its lowest point and is usually used for probable maximum discharge studies which may need to be performed for the design of some of the detention basins identified as a part of this Drainage Master Plan. Soil groups were evaluated at both AMC II and AMC III conditions for this study. Table 4 gives the hydrologic soil groups used in this study along with the corresponding AMC II and AMC III values.

Put Soils Map Here

Figure 4 Soils Map

Table 4 NRCS Soil Groups With Curve Numbers

Hydrologic Soil Group	AMC Type II Curve Number	AMC Type III Curve Number
A	60	78
B	73	85
D	84	94

V.4c Sediment Bulking

Two soil samples were taken during the December 5th, 2012 site trip. Sample A was taken east of the intersection of La Union Street and Visanga Street, while Sample B was taken in the arroyo west of the intersection of Alvarez Road and Visanga Street. The resulting gradation curves can be found in Appendix E. For the purpose of this study, hydraulic models were not bulked for sediment transport to provide a clear water comparison of the proposed options. Final design of the preferred option should include an appropriate bulking factor.

V.5 Numerical Models and Methodology

As per Doña Ana County Flood Commission (DACFC) drainage criteria, the hydrologic analysis was conducted with the U. S. Army Corp of Engineers (USACE) Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) Version 3.5 and based on the SCS methodologies. Land use, slopes and drainage divides used for the modeling effort were based on orthophotographic mapping and 2-foot interval contours provided by the DACFC.

V.5a Lag Time

Lag time is a time estimate for the peak runoff for the basin to travel to the discharge point for that particular basin. Each basin was divided into overland flow, shallow concentrated flow, and channelized. A travel time was calculated for each of these flow types by classifying flow as either overland flow or shallow concentrated flow. The upper extent of the sub-basin is characterized as overland flow, while the remainder of the basin is classified as Shallow Concentrated Flow or Concentrated Flow. Using the flow type, the flow path slope and the length, the velocity and lag time were computed for each sub-basin. Lag time is also affected by the AMC at the time of the storm event; therefore, lag times were calculated for both AMC II and AMC III. Detailed calculations can be found in Appendix D.

V.5b Loss Method

Curve number (CN) values were selected, per Technical Release 55 (TR-55) methodology, to reflect the soil types mapped by the NRCS. Modeling assumed a hydrologic soil condition for watersheds in fair to poor condition having moderate potential to infiltrate runoff due to soil surface, vegetative cover and minimal compaction due to human activity. The CN values provided by TR-55 are for antecedent moisture condition (AMC II). Average conditions were adjusted according to Table 10-1 of the National Engineering Handbook Part 630 to AMC III curve numbers to reflect the high antecedent moisture condition for this analysis. Refer to the curve number calculations that can be found in Appendix D for additional information.

V.5c Routing

This study utilized the Muskingum-Cunge procedure for channel routing. This method is appropriate for natural channels such as arroyos in the study area. The channel cross-section geometry required for this method was derived from the topographic base map. Mannings "n" values for the main arroyo channels were assumed to be 0.030 for both the channel bottom and overbank areas.

V.5d Input Parameters Summary

The following table is a summary of the basin input parameters for the HEC-HMS existing conditions hydrologic model. Detailed calculations can be found in Appendix D.

Table 5 Existing Hydrologic Analysis Input Parameters

Basin	Area (sq.mi.)	CN		T lag (min)		Impervious (%)
		AMC II	AMC III	AMC II	AMC III	AMC II & III
110	0.25	61	78	102	65	0
120	0.13	60	78	79	51	0
130	0.09	60	78	56	37	0
140	1.37	65	81	199	135	0
150	0.05	60	78	75	48	0
160	1.12	66	82	321	214	0
205	0.02	68	83	36	27	16
215	0.04	64	81	45	33	15
225	0.04	63	80	51	37	12
235	0.02	63	80	35	26	14
245	0.06	67	83	40	30	14
255	0.04	63	80	57	40	7
265	0.03	66	82	60	43	3

V.6 Hydrologic Analysis Results

In order to determine the drainage affecting the La Union area, and evaluate the effectiveness of proposed improvements, Larkin performed a HEC-HMS analysis of the three-square-mile contributory watershed for the La Union area. This analysis was routed to and compared at Analysis Point AP 13, the point where Aguila Avenue crosses the West Drain. A summary of the major flow paths and preliminary flow rates is presented in Figure 5. See Appendix D for detailed calculations and analysis methodologies.

Table 6 Existing Hydrologic Analysis Summary

Basin	Area (ac)	Q_{10} (cfs)		V_{10} (ac-ft)		Q_{100} (cfs)		V_{100} (ac-ft)	
		AMC II	AMC III	AMC II	AMC III	AMC II	AMC III	AMC II	AMC III
110	157	31.3	81.1	7.8	13.5	69.3	164.5	16.9	26.4
120	82	19.9	52.2	4.0	7.0	44.1	105.7	8.6	13.8
130	55	17.9	46.0	2.7	4.7	39.9	92.6	5.8	9.3
140	875	182.8	260.4	79.3	81.1	362.9	518.6	156.8	158.3
150	31	8.0	21.1	1.5	2.7	17.7	42.7	3.3	5.3
160	717	59.1	144.7	38.8	67.0	127.3	285.6	83.9	131.5
205	14	11.8	21.1	1.2	1.6	22.4	38.0	2.2	3.0
215	28	17.3	32.7	2.1	3.0	33.5	60.4	4.0	5.5
225	26	13.7	27.0	1.9	2.8	27.0	50.6	3.6	5.1
235	9	7.2	13.5	0.7	1.0	13.9	24.8	1.4	1.9
245	37	26.9	50.4	3.0	4.3	52.0	91.8	5.6	7.7
255	27	11.4	24.5	1.7	2.7	23.4	47.2	3.4	5.0
265	22	8.7	19.1	1.4	2.2	18.4	37.0	2.8	4.1

Insert Existing Hydrology Exhibit

Figure 5 Existing Hydrology

VI. Hydraulic Analysis & Methodology

For the purposes of this study the hydraulic analysis was broken into separate analyses and methodologies; routing through the dams was performed with HEC-HMS, pipe flows were determined by calculating pipe losses, and street flows and open channel flows were calculated by normal depth calculations. Again for all methodologies, the effects of the two existing dams known as La Union Dam A and La Union Dam B were not included in the hydraulic analysis. The point where Aguila Avenue crosses the West Drain was selected as Analysis Point 13 (AP-13) in order to more efficiently compare the results of the proposed improvements. The results of this analysis are presented later and the model files are included on a compact disk as Appendix G.

VI.1 Numerical Models and Methodology

For the purposes of this study the analysis was conducted as follows:
Stage-storage routing with HEC-HMS was used to route flows through the proposed dam structures. A spreadsheet was produced to calculate the capacity of a ported outlet tower as the water surface rises. As the water surface increases, the ports change from weir flow to orifice flow conditions for each water surface elevation. Flow Master calculations of normal depth flows were used for street flows and open channel flows.

VII. Study Results

Given the characteristics of storms in the La Union area and the relatively low Curve Numbers from AMC II, for the purposes of this study it would be more conservative and more practical to base improvement design on AMC III conditions. Table 7 presents a summary of the resulting flow rates evaluated at several analysis points (AP) with AP 13 being the Aguila Avenue crossing of the West Drain.

Table 7 Study Summary

Analysis Point	Q Existing (cfs)		Q-One Dam (cfs)		Q-Two Dams (cfs)	
	10-YR	100-YR	10-YR	100-YR	10-YR	100-YR
AP 1	174	352	128	196	187	269
AP 2	261	520	32	60	33	60
AP 3	39	72	39	72	13	25
AP 4	147	287	50	92	50	92
AP 5	25	47	25	47	24	47
AP 13	441	876	130	196	269	422

The one dam option will require the construction of a dam that would be a jurisdictional structure as per New Mexico Dam Safety Bureau, but would produce the most benefit for the citizens of La Union and Elephant Butte Irrigation District. Please see the following exhibits for the results and Appendices F and G for the calculations.

VIII. Elephant Butte Irrigation District West Drain

Water draining from La Union or the highlands to the west of La Union now drains to the valley floor. Most flows are blocked by the Little La Union Lateral and simply pond in the fields until they infiltrate or evaporate. However, very large flows, such as those resulting from a 100 year storm over top the Little La Union Lateral and flow into the West Drain. The West Drain provides a drainage outlet for irrigation flows and storm water flows. This drain provides drainage for the west side of the Rio Grande valley floor and the highlands that drain into the valley floor from near San Miguel to east of Santa Teresa, where it crosses under the Rio Grande and finally

discharges to the Rio Grande near Doniphan Dr. and Racetrack Drive. The drain runs approximately 30 miles from its beginning near San Miguel to the crossing of the Rio Grande.
In this length, the drain has the potential of accumulating a very large flow during rainy weather. In discussions with Elephant Butte Irrigation District (EBID) flow restriction points along this reach were discussed. The most stringent control is at the siphon under the Rio Grande. At this point the design capacity is approximately 140 cfs, but the observed actual capacity is approximately 90 cfs. This is far less than the potential flow in the drain and causes extensive flooding. For this reason EBID cannot allow any increase in flow in the drain.

Because the drainage area under study in this master plan is quite small in relation to the drainage area tributary to the West Drain, drainage facilities planned under this study will not have a major effect on the operation of the drain. However, in view of the seriousness of the flooding along the lower reaches of the drain an analysis point was established in the drain at the southeast corner of the study area. Flows from a 100 year storm with various alternative plans for drainage were routed to this point. See Table 7 for these results.

Under current conditions the 100 year flow from the drainage area of this study is 876 cfs. With the one-dam concept the flow would be 196 cfs and with the two dam concept as set out in the report the peak flow from the La Union area would be 422 cfs. The two dam concept as described is predicated on the dams being small enough to be non-jurisdictional under the requirements of the New Mexico Dam Safety Bureau. Therefore, either plan set out in this study would make a positive contribution to the flooding problems of the West Drain by reducing the flow rate in the 100 year event.

While it is understood that EBID cannot allow any increase in flow in the West Drain, either of these options would actually reduce the flows from the 100 year event and remove pollutants that are now getting into the West Drain.

IX. Storm Water Quality

Given the existing soil conditions, the primary storm water quality concerns will be sediment and floatables. The ponds proposed for the one pond and two pond options could be fitted with ported towers or hooded outlets to effectively reduce both pollutants. Flow from the urban area of La Union would not pass through these ponds since the ponds must be above the community to protect it from flooding. However, flows from the community could be carried to different pond locations (See Figure 6) as discussed with EBID, near the drain to allow settling of the silt and capture of the floatables by ported towers or hooded outlets, before the flow is discharged to the drain.

X. Consideration of Alternatives and Recommendations

Three alternatives are presented for consideration- a no-build alternative, a one pond alternative and a two pond alternative. It is understood that construction of the preferred alternative will require close coordination and timing with EBID improvements in West Drain channel improvements. *It is also understood that, given the current condition and capacity of the West Drain, that no drainage improvements can be tied into the EBID system until the West Drain is improved.*

The no-build alternative would not have an immediate financial cost. However, it would not meet the purpose and need, to protect this historic town site from damage and danger caused by flooding from the higher land to

the west. The damage could include the loss of historic structures and artifacts from this historic site, as well as damage to the homes and businesses of the residents. Of course, the danger could include injury or the loss of life if persons were caught in a major flood at this site. Therefore, a no-build alternative that does not meet the purpose and need of this study is not acceptable and will not be recommended.

The Alternate 1 plan would provide for the construction of short diversion channels and two ponds of 43.3 acre-feet and 49.5 acre-feet. See Figure 11. Their size would not place them under the jurisdiction of the New Mexico Dam Safety Commission. The north pond would be located on the same site as for the one-pond plan. The outlet pipe would also follow the same route as for the one-pond plan. The second pond would be located west of Visnaga Road and near the intersection of San Antonio and Visnaga. The outlet pipe would flow east on San Antonio, angle southeast to Conejo St. between Mendez Avenue and Sentenario St.,then turn north on Sentenario St. to Commercial where it would turn east to the West Drain. The construction cost of this plan is estimated to be $6.3 million.

The Alternate 2 (See Fig. 9)plan would consist of construction of an interceptor ditch to intercept flows from the arroyo flowing from the agriculture pond designated La Union B along with the other arroyo flows from the high lands to the west, construction of a 150 acre-foot detention pond west of Visnaga St. near the north edge of the community, and construction of a 36 inch diameter storm drain east from the dam along Rosales St. to Alvarez Road, To La Union St. and east along Commercial St. to the West Drain. This storm drain will allow construction of inlets north of Rosales St. to reduce flooding in the far north corner of La Union. The pond would be equipped with a ported tower outlet to allow removal of floatables and the pond would allow settling of silt. Construction of this plan is estimated to cost $ 6.9 million.

Both of the two build alternatives we have presented includes a plan to reduce damage and inconvenience from smaller local storms that currently cause considerable damage to the community. This plan utilizes improved road ditches, inverted crowns on some streets, and infiltration basins to allow the storm water to infiltrate into the ground. Design of the infiltration basins has not been completed under this master plan. We anticipate that the capacity will be sufficient to handle flows from a moderate storm based on visual examination of the soils, but in the event that the capacity is not sufficient, excess water could be allowed to flow to the ponds shown in Figure 6 as "Possible Ponding Locations" for settling and removal of floatables before discharge to the West Drain.

A preliminary evaluation of the two soil samples (See Appendix E for gradation curves), taken on the December 5th, 2012 site visit, indicates that the existing materials might be suitable for the production of a cost-effective soil cement design mix. This could be used for the construction of economical erosion control structures. It also indicates that the soil would be suitable for infiltration basins.

Figure 6 Possible Ponding Locations

Property west of the Townsite where the detention ponds would be constructed is owned partly by the US government and partly by Sam Crossett. With the two pond concept one pond would be constructed on Federal land and the other would be built on Crossett land. The one pond concept calls for the construction of one pond on Federal land. However, a diversion ditch would be constructed to divert flows from the southern arroyos to the pond. Part of this ditch would be constructed on Crossett land.

Staff members of the Dõna Ana County Flood Commission have interviewed Mr. Crossett. He has expressed a strong preference for the one pond concept because it could be constructed with the diversion ditch some distance to the west of the Townsite. This would provide Mr. Crossett with more land below the ditch and therefore protected from flooding and suitable for development. It would also reduce the amount of land that would be required from Mr. Crossett's property. This could represent a financial savings to the County.

Cost estimates for the two build alternatives are provided in Appendix G. Because the reduction in flow to the West Drain with the one dam alternative is at least as great as for the two dam alternative, the one dam alternative requires less total land and uses mostly Federal land for the ponding area, the one dam alternative provides more developable land which could increase the economy of the Townsite area, and the One Dam alternative is preferred by the owner of the lands needed for the two dam alternative, we are recommending that first priority be given to the development of the one dam alternative in spite of the fact that it's construction cost is greater than the two dam alternative.

Alternative for Discussion / Exploration

La Union Dam A and La Union Dam B currently exist and may not have been designed for the 100-year storm event. However, they are located on basins that produce 285 cfs and 518 cfs, respectively, and it might be cost-effective to discuss upgrading these structures with the NRCS.

XI. Recommendations

Based upon the analysis presented above, Larkin provides the following conclusions and recommendations:

1. No build. The no-build solution is always an option, but this option does not meet the purpose of the Doña Ana County Flood Commission nor does it serve the needs of the residents of the Townsite.
2. The construction of a diversion channel and a detention dam with an outfall pipe to the West Drain (See Alternate 2,) Single Dam Preliminary Channel & Dam plus Single Dam Preliminary Plan & Profile) would protect the Townsite from storm water flows from the 100-year event. The construction of this outfall pipe will provide the opportunity to install drop inlets in the Rosales Street area, addressing a noted problem area and reducing the existing Zone A floodplain.
3. The construction of two smaller diversion channels and two smaller detention dams with outfall pipes to the West Drain(See Alternate1)would protect the community from storm water flows from the 100-year event. The construction of these outfall pipes would also provide the opportunity to install drop inlets in the Rosales Street area, addressing a noted problem area and reducing the existing Zone A floodplain.
4. The current drainage philosophy is to use a 2% crown road cross-section to divert storm water runoff off the street to roadside bare earth drainage swales. Converting the existing street section to an inverted crown section (See Pages 23 and 24) will protect the community during the more frequent smaller events and reduce the current sediment transport situation. See Preliminary Street Flow Capacities for street capacities and possible locations for infiltration galleries. Pending the preferred detention dam option, the current streets could be modified with a combination of standard curb and gutter and inverted crown sections to reduce the flooding problems the residents currently experience.

Figure 7 Proposed Hydrology Option 1

Figure 8 Proposed Hydrology Option 2

Figure 9 Single Dam Preliminary Channel & Dam Option 2

Figure 10 Single Dam Preliminary Plan & Profile Option 2

Figure 11 Alternative Dams Layout Option 1

Figure 12 Preliminary Street Flow Capacities

Figure 13 Proposed Street Improvements One Dam Option

Figure 14 Proposed Street Improvements Two Dam Option

XII. Bibliography, References & Special Thanks

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- FEMA Map Service Center, Effective FIRMs/FHBMs, Flood Insurance Studies (FIS), Effective Flood Insurance Studies (FIS), https://msc.fema.gov/webapp/wcs/stores/
- National Engineering Handbook, Part 360 Hydrology, Chapter 7 Hydrologic Soil Groups, January 2009, http://directives.sc.egov.usda.gov/
- New Mexico State Highway and Transportation Department (NMDOT), Drainage Manual, Volume I, Hydrology, 1995
- Sperlings Best Places, Population Data, Best Places to Live in La Union, New Mexico, http://www.bestplaces.net/city/new_mexico/la_union
- U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), Soil Data Mart Website, Doña Ana County, New Mexico, http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NM013
- U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Doña Ana County Area New Mexico, 1977
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), Average Annual Climatic Data, National Climatic Data Center, by Zipcode, http://gis.ncdc.noaa.gov/map/viewer/#app=cdo&cfg=cdo&theme=annual&layers=1&node=gis
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Office of Hydrologic Development, Hydrometeorological Design Studies Center, Precipitation Frequency Data Server (PFDS), http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Special Thanks To
The citizens of the Townsite of La Union and Parish Hall

APPENDIX A: FIRM

APPENDIX B: DESKTOP ENVIRONMENTAL REVIEW

APPENDIX C: PUBLIC COMMENT

APPENDIX D: HYDROLOGY

Methodology

All hydrologic calculations were performed in accordance with the current Doña Ana County Design Standards. The effects of both the 100-year and the 10-year frequency storms were evaluated for the purposes of this study. Hydrologic analysis methods chosen were dependent on basin size of rural conditions as described in the selection flow chart of the NMDOT manual. Basin and hydrologic soil group delineations were accomplished with AutoCAD Land Enabled Map; rainfall runoff calculations were made using Microsoft Excel and MathCAD software.

Table D1 Basin Soil Type Composition

Basin	Area			Soil Type %			
	(sq.ft.)	(sq.mi.)	(acre)	A	B	C	D
110	6,820,042	0.245	157	100	0	0	0
120	3,580,717	0.128	81	100	0	0	0
130	2,400,814	0.086	55	100	0	0	0
140	38,116,182	1.367	875	100	0	0	0
150	13,631,270	0.049	31	100	0	0	0
160	31,217,691	1.120	717	100	0	0	0
205	602,347	0.022	14	67	33	0	0
215	1,209,757	0.043	28	92	8	0	0
225	1,151,588	0.041	26	100	0	0	0
235	409,085	0.015	9	100	0	0	0
245	1,619,461	0.058	37	70	30	0	0
255	1,161,135	0.042	27	100	0	0	0
265	950,480	0.034	22	78	22	0	0

Table D2 AMC II Curve Number Values

Soil Type	Poor	Fair	Good
A	63	55	49
B	77	72	68
C	85	81	79
D	88	86	84

APPENDIX E: SOILS

APPENDIX F: HYDRAULIC ANALYSIS

APPENDIX G: COST ESTIMATES

APPENDIX H: COMPACT DISK WITH COMPUTER MODELS

NLCE-13-007-13-002

FINAL

Desktop Environmental Review of the Town of La Union

Doña Ana County, New Mexico

March 2013

Quality ■ Commitment ■ Service

zia engineering & environmental consultants, llc

DESKTOP ENVIRONMENTAL REVIEW OF THE TOWN OF LA UNION

DOÑA ANA COUNTY, NEW MEXICO

Zia Project # NLCE-13-007
Document # NLCE-13-007-13-001
Submission Date: 5 March 2013

Prepared for:

Larkin Group NM, Inc.
8500 Menaul Blvd. NE, Ste. A-440
Albuquerque, NM 87112
Phone:(505)275-7500
Fax:(505)275-0748

Submitted by:

755 S. Telshor Blvd., Suite F-201
Las Cruces, New Mexico
(575) 532-1526 voice
(575) 532-1587 fax

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **II**

ACRONYMS ..... **IV**

1.0 INTRODUCTION **1**

1.1 Purpose and Need 1

2.0 REVIEWED RESOURCES **1**

2.1 Soils 5

2.1.1 Recommendation *6*

2.2 Paleontology 7

2.2.1 Recommendation *7*

2.3 Cultural Resources 7

2.3.1 Archeological Resources *9*

2.3.2 Historical Properties *10*

2.3.3 Recommendations *10*

2.4 Natural Resources 12

2.4.1 Threatened and Endangered Species *13*

2.4.2 Migratory Birds *16*

2.4.3 Recommendations *16*

2.5 Wetlands 17

2.5.1 Recommendation *17*

2.6 Air Quality 18

2.6.1 Recommendation *19*

2.7 Water Quality 19

2.7.1 Surface Water / Ground Water *19*

2.7.2 Recommendation *21*

2.7.3 Floodplains *22*

2.7.4 Recommendation *22*

2.8 Socioeconomics 23

2.8.1 Recommendations *23*

2.9 Environmental Justice 25

2.9.1 Recommendation *25*

3.0 OTHER PERMITTING REQUIREMENTS **25**

4.0 CONCLUSION **26**

5.0 PREPARERS **27**

6.0 REFERENCES **28**

Tables

Table 1: Soils Types Located within La Union 5
Table 2: Previous Surveys within One Mile of the Project Area 9

Figures

Figure 1. Project Area Vicinity Map 2
Figure 2. Topographic Map 3
Figure 3. Aerial Map 4
Figure 4. Soils of La Union 5
Figure 5. Farmland Soils of La Union 6
Figure 6. Paleontological Map 8
Figure 7. Historical and Cultural Properties Map 11
Figure 8. Ecosystem Map of Doña Ana County 13
Figure 9. Critical Habitat Map 14
Figure 10. National Wetlands Inventory Map 17
Figure 11. EPA Region Map 18
Figure 12. Mesilla Bolson Map 20
Figure 13. FEMA Flood Insurance Rate Map for La Union 23
Figure 14. EPA Minority Map 24
Figure 15. EPA Poverty Map 24

Appendices

A – Soil Descriptions
B – Threatened and Endangered Species Lists
C – New Mexico Department of Game and Fish Guidelines

ACRONYMS

BLM	Bureau of Land Management
CAA	Clean Air Act
CWA	Clean Water Act
EBID	Elephant Butte Irrigation District
FEMA	Federal Emergency Management Agency
FIRM	flood insurance rate maps
LA	Laboratory of Anthropology
NAAQS	National Ambient Air Quality Standard
NEAP	Natural Events Action Plan
NMDGF	New Mexico Department of Game and Fish
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NMRPTC	New Mexico Rare Plant Technical Council
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
SOC	Species of Concern
SWPPP	Stormwater Pollution Protection Plan
TES	Threatened and Endangered Species
US EPA	U.S. Environmental Protection Agency
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

Zia Engineering & Environmental Consultants, LLC (Zia) was retained by Larkin Group NM, Inc. (Larkin) to conduct a desktop environmental review (Zia Project Number: NLCE-13-007) of the town of La Union of La Union, Doña Ana County, New Mexico (Figure 1).

Zia understands that Larkin is compiling a Master Plan for the town of La Union in reference to the area's drainage and erosion concerns. As part of the Master Plan, potential environmental concerns that may currently exist within La Union and may potentially inhibit, slow or positively impact the proposed project are addressed within this desktop environmental review.

Per the signed proposal (PLCE-12-032, signed January 31, 2013), no field surveys were conducted as part of this desktop environmental review and no consultation efforts with potentially concerned agencies were completed. The review contains Zia's professional knowledge of known environmental concerns and the use of internet resources which are used as part of an environmental assessment or pre-field analysis.

At the time of submittal of this environmental review, Larkin was in the process of developing alternatives for the Master Plan. It was requested of Zia to conduct a complete desktop environmental review of the entire town of La Union with the understanding that the final product suggested by Larkin may not include impacts to the entire town of La Union.

1.1 PURPOSE AND NEED

The town of La Union has been battling drainage and erosion impacts from rain events. Several streets and residential properties have been flooded due to large water flows from these events.

Run-off from the neighboring mesa is also contributing to the additional water flows within the region. Larkin was hired to address all erosion and drainage concerns for La Union within a Master Plan. This Master Plan would then be used for future use by La Union to receive grants or other sources of funds to address the area's concerns.

2.0 REVIEWED RESOURCES

The town of La Union along with land west of the town is included within the environmental review. Management of the lands within this area is private and Bureau of Land Management (BLM) lands (Figures 2 and 3). The resources below are those resources that are of concern to the BLM. Potential impacts that may be incurred on a resource are specifically identified. Actions that would need to occur prior to any project beginning will be identified within that particular resource.

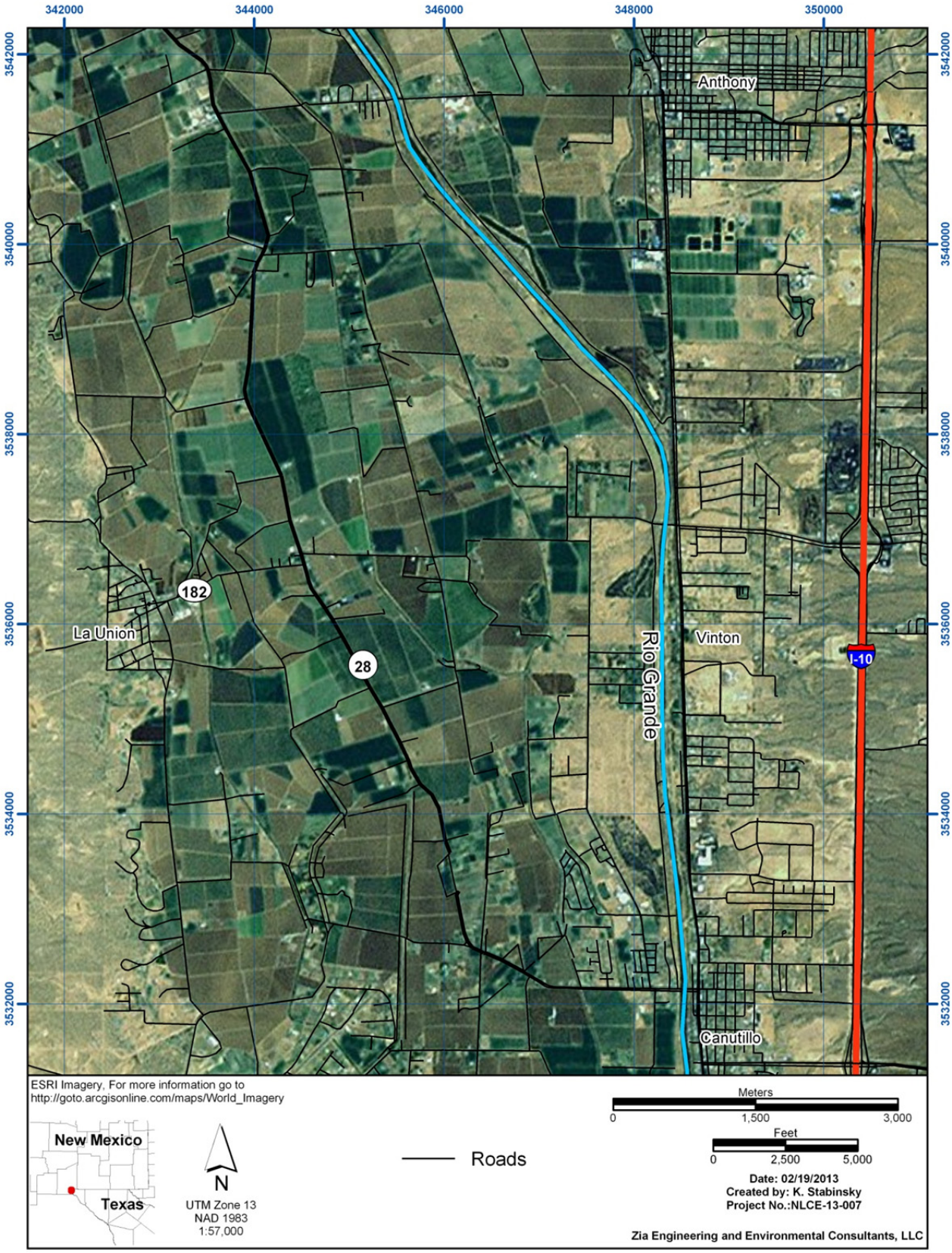

Figure 1. Project Area Vicinity Map

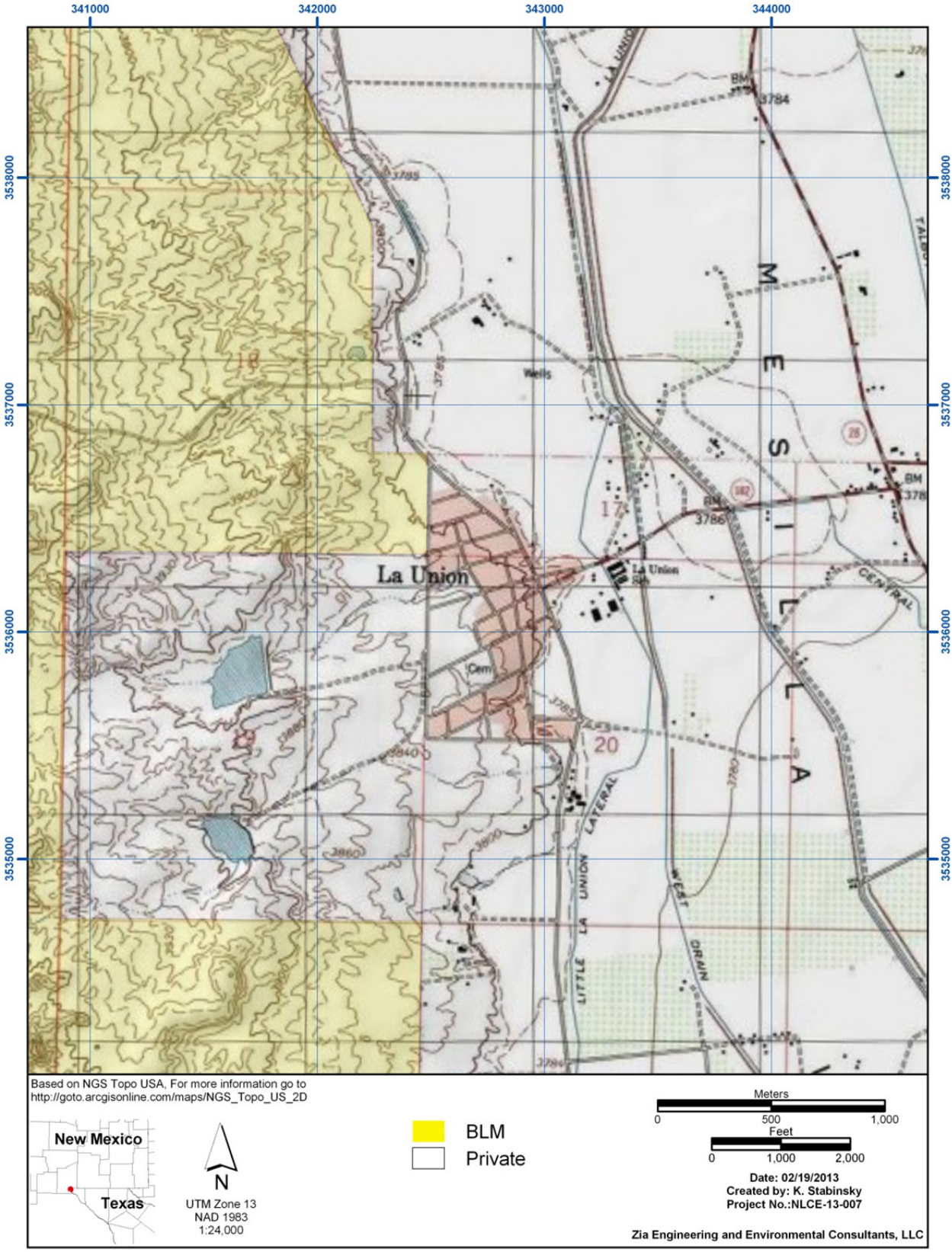

Figure 2. Topographic Map

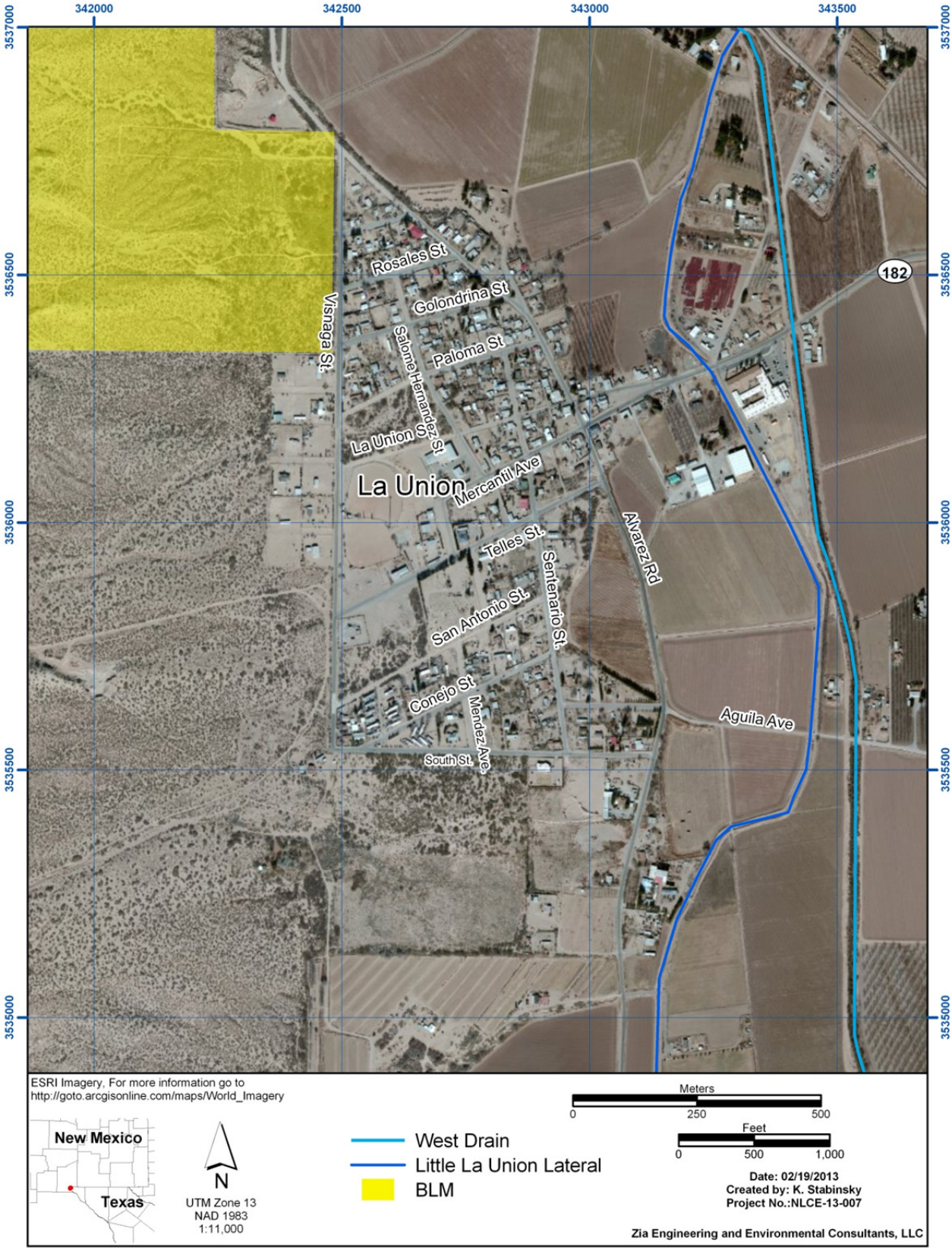

Figure 3. Aerial Map

2.1 SOILS

The area of concern for this desktop environmental review contains 14 soil types. These soils are identified in Table 1 and shown on Figure 4. Those soils which are identified as Farmland Soils of Statewide Importance are recognized next to the name. A description of each soil is provided in Appendix A.

TABLE 1: SOILS TYPES LOCATED WITHIN LA UNION

Soil Code	Soil Name	Farmland Soil of Statewide Importance
Ad	Adelino sandy clay loam	X
Ag	Agua loam	X
Ao	Anapra clay loam	X
Ar	Anthony-Vinton loams	X
Bf	Belen clay loam	X
Bm	Bluepoint loamy sand, 1 to 5 percent slopes	X
Bn	Blupoint loamy sand, 5 to 15 percent slopes	
BP	Bluepoint-Caliza-Yturbide complex	
Ge	Glendale loam	X
Gf	Glendale clay loam	X
Hg	Harkey loam	
Pa	Pajarito fine sandy loam	X
RF	Riverwash-Arizo complex	
Vg	Vinton variant sandy clay loam	X

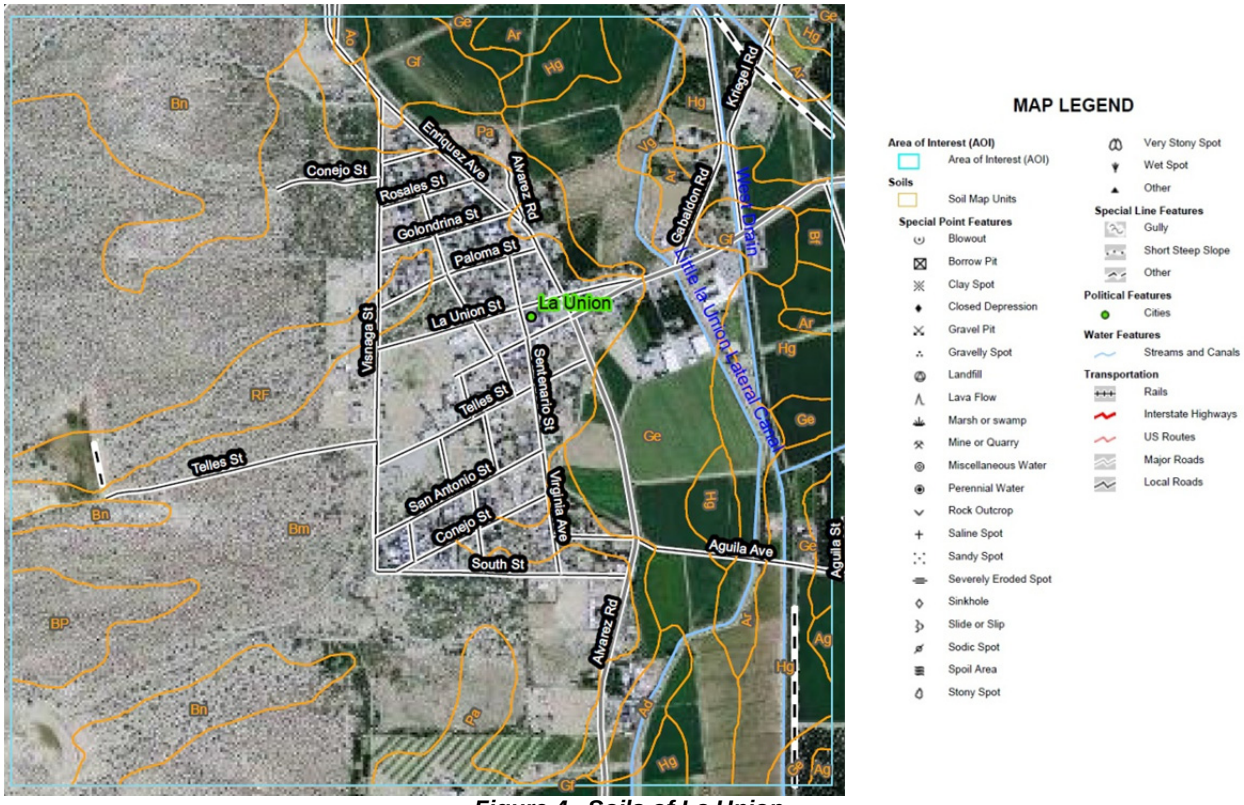

Figure 4. Soils of La Union

Image cropped from Soil Map of La Union generated by NRCS Web Soil Survey (NRCS 2010)

Farmland Soils of Statewide Importance are singled-out due to the Farmland Protection Policy Act. Federal agencies are required to protect lands with prime or unique farmland distinctions and prevent conversion of these lands for local or nonagricultural use.

According to the Natural Resources Conservation Service (NRCS) for New Mexico, soils must be comprised of over 50 percent prime, unique or statewide importance soils to be protected under the Farmland Protection Policy Act (USDA 2013) (Figure 5).

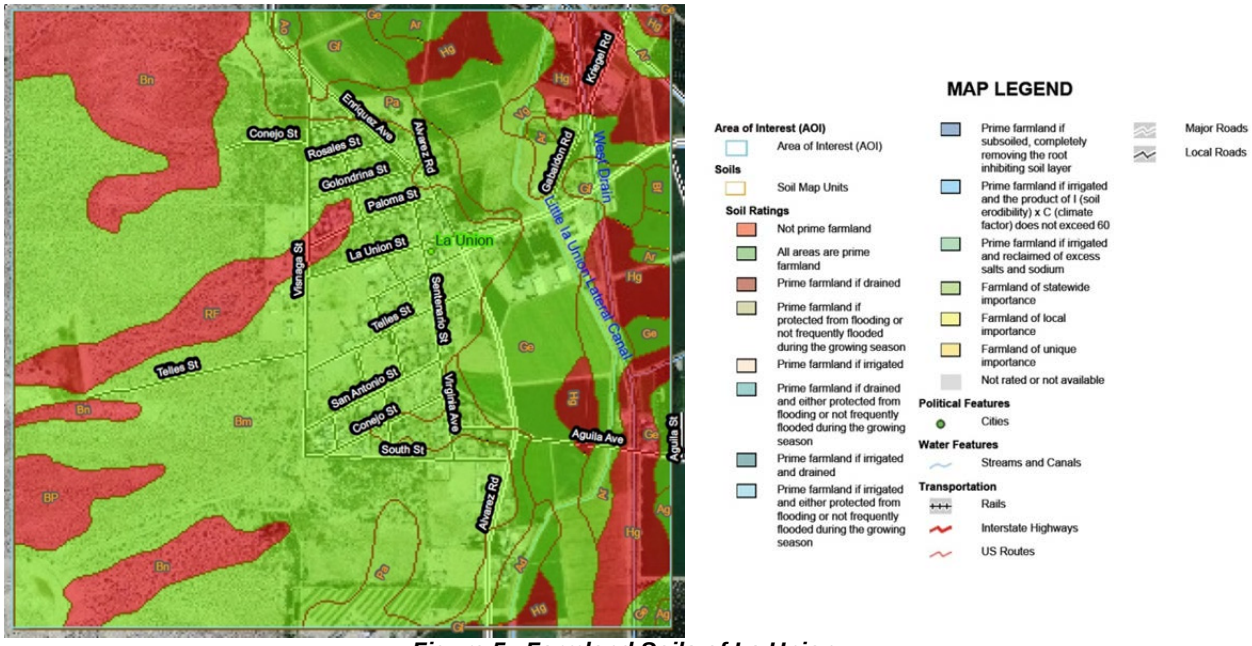

Figure 5. Farmland Soils of La Union
Image cropped from Farmland Map of La Union generated by NRCS Web Soil Survey (NRCS 2010)

2.1.1 Recommendation

Consultation with NRCS should be conducted whether or not the project impacts Farmland Soils of Statewide Importance. Response from NRCS is not expected to halt the project due to the high disturbance levels of soils within the area. However, NRCS would provide recommendations if the soils are deemed to be protected by the Farmland Protection Policy Act.

For consultation, contact the following:

Adrian Tafoya, District Conservationist
NRCS Service Center Office
Las Cruces Service Center
2507 North Telshor Blvd.
Las Cruces, NM 88011-8222
Phone: 575.522.8775
Fax: 877.450.0861
Email: adrian.tafoya@nm.usda.gov

2.2 PALEONTOLOGY

Paleontology is a resource of concern if the proposed project impacts are conducted on BLM lands. As of February 2012, BLM requires a paleontological resources study to be conducted by a BLM permitted paleontologist. Figure 6 is a map that would be used by this permitted individual. It shows the potential fossil yield classification in the area along with discoveries of paleontological resources.

The areas with the highest potential for paleontological resources are located along the top of the mesa west of La Union (Figure 6). The areas closest to the river have the least potential for these resources.

2.2.1 Recommendation

If the project area contains BLM lands, consult with the BLM realty specialist assigned to the project. He/she should provide a list of permitted paleontologists that are permitted for the State of New Mexico. The permitted individual may or may not require conducting field surveys, and the analysis may be conducted via desktop. However, it is under the discretion of the BLM and the permitted individual for the level of effort. Consultation on this effort should begin at the start of the environmental analysis of the proposed project.

For consultation, contact the following:

Las Cruces District Office
Bureau of Land Management
1800 Marquess Street
Las Cruces, NM 88005-3370
Phone: 575.525.4300
Fax: 575.525.4412

2.3 CULTURAL RESOURCES

On February 20, 2013, Zia examined the online New Mexico Archaeological Records Management Section (ARMS) online site database to determine if previously recorded sites were located within one mile of the proposed project area. In addition, Zia examined the national and New Mexico registers of historic places to determine if any properties not found on the ARMS database were present within one mile of the proposed project area (New Mexico Department of Cultural Affairs - Historic Preservation Division 2013; National Register of Historic Places 2013). Zia also examined previously conducted cultural resources projects, using the ARMS system, within one mile of the proposed project area. The results of these activities are discussed below.

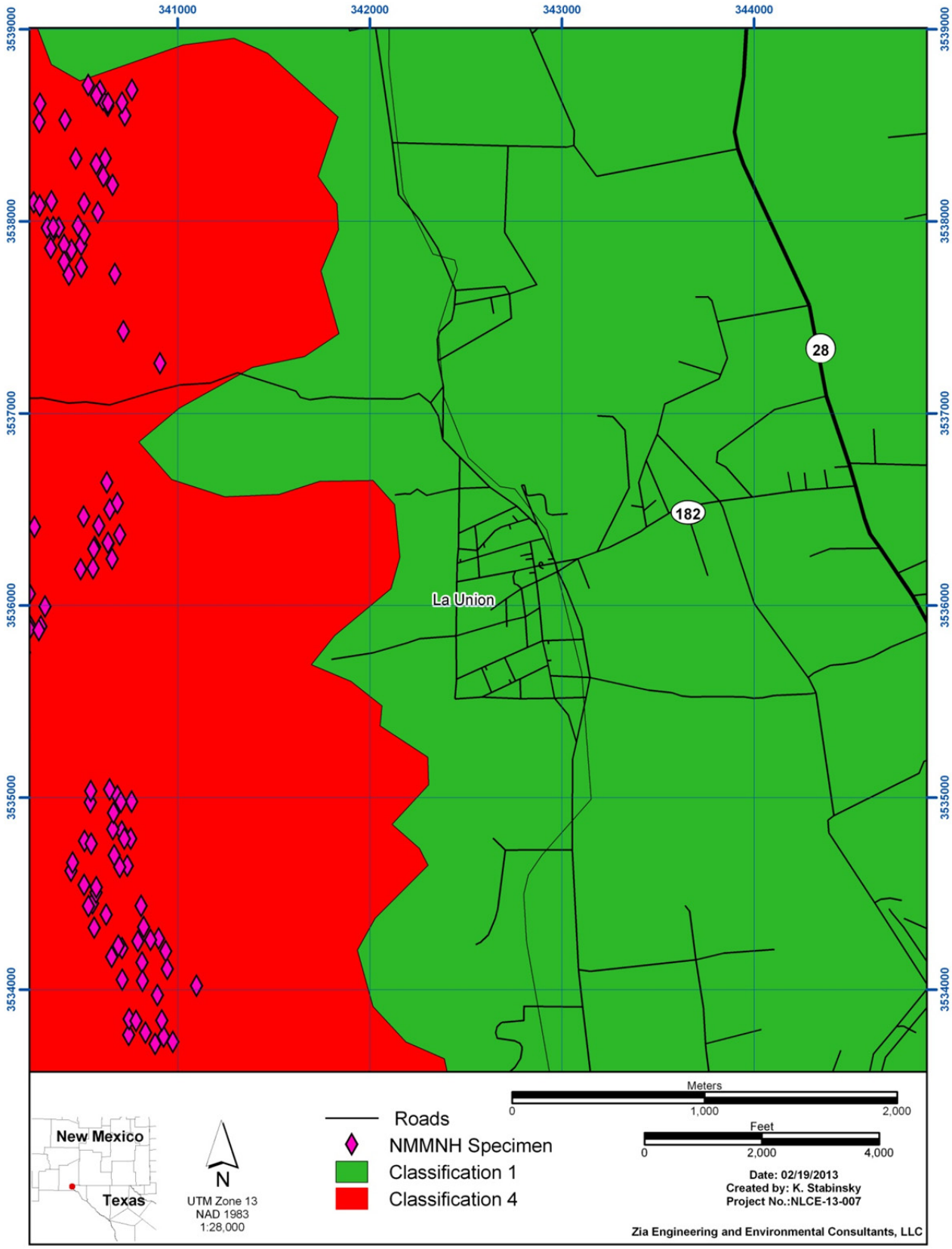

Figure 6. Paleontological Map

2.3.1 Archeological Resources

Previous Archaeological Projects

Four previous archaeological surveys have been conducted within one mile of the proposed project area (Table 2). Two of these surveys (Brown 1997 and Raymond and Sullins 2002) may be of use to the present project. Both of these works documented linear alignments associated with water and wastewater projects within the streets of La Union. In both projects, no archeological sites were identified.

TABLE 2: PREVIOUS SURVEYS WITHIN ONE MILE OF THE PROJECT AREA

NMCRIS NO.	FIRM	ACRES	NUMBER OF SITES FOUND	PROJECT AUTHOR/DATE	POTENTIALLY CROSSES PROJECT AREA?
31185	NMSU CRMD	10829	27	Heinsch 1980	No
39063	ASLM	0.29	0	Michalik 1992	Yes
55428	Archaeo-Associates	119	0	Brown 1997	Yes
75977	Taschek	29.9	0	Raymond and Sullins 2002	Yes

ASLM=Archaeological Services by Laura Michalik; NMSU CRMD=New Mexico State University Cultural Resources Management Division

Previously Documented Archeological Sites

One archaeological site, Laboratory of Anthropology (LA) number 2415, has been documented within one mile of proposed project area. This site is associated with the Formative (or ceramic) period, and contains adobe room blocks.

The site was documented in 1932 by Herbert Yeo. Many of Yeo's sites, including this one, were poorly plotted on maps, and thus the site's actual location is unknown. Similarly, the documentation for this site is very poor. The site was revisited by Archaeo-Associates (Brown 1997), but the site could not be relocated. Because of building development since the 1930s, the site could have been destroyed, but it may be buried within unknown contexts within La Union.

Previously Documented National and State Register Properties

Two in-use acequias, the Little La Union Lateral and the West Drain are located in the proposed project area. Both of these features are associated with the national register-listed Historic Elephant Butte Irrigation District (EBID). This district was established on both the national and New Mexico register in 1997.

Potential for Additional Archaeological Properties

Given the previous cultural resources projects that have occurred within La Union, there is a low potential for archaeological sites. Within the undisturbed sandy contexts of the benches above the Rio Grande to the west, the potential for archaeological sites is much higher. No previous surveys have been conducted in these areas, so it is impossible to determine without conducting archaeological surveys.

2.3.2 Historical Properties

As part of cultural resources surveys in New Mexico, structures greater than 45 years in age and within 50 feet of the proposed project area should be evaluated and documented using the New Mexico State Historic Preservation Division Historic Cultural Properties Inventory Forms. The purpose for this is to identify historic structures that may be subjected to visual and vibratory effects from construction activities. Zia reviewed the Dona Ana County Tax Assessors Office Research Database to determine the potential number of historical buildings located within the project boundary. Approximately 95 historic homes (age 45 years or older) and two in-use acequias, Little La Union Lateral and the West Drain, were identified within the project area (Figure 7).

2.3.3 Recommendations

Consultation with the Historic Preservation Office will be required. It is likely that the Historic Preservation Division will require a cultural resources survey of the entire proposed right-of-way, so avoidance of significant archaeological properties remains possible.

All of the sites within the proposed corridor will have to be updated to meet current standards for New Mexico and historic buildings and acequias within 50 feet of the pipeline right-of-way will have to be documented. A report of findings will be required and eligibility recommendations will need to be made and concurred upon by the lead agency and the Historic Preservation Division.

NRHP-eligible properties that will be adversely impacted by the proposed project will require data recovery efforts within the proposed right-of-way. A data recovery plan for the impacted sites will have to be written and approved by the New Mexico Cultural Properties Review Committee or other appropriate agency.

The data recovery treatment will vary depending on the site, but usually involves excavation activities. As these activities are costly in time and money, avoidance of eligible cultural properties is usually preferred. If avoidance of sites is not possible, limiting of construction impacts within site boundaries may reduce excavation costs.

It is recommended that all necessary steps be taken to reduce the vibratory effects within 50 feet of the historic structures, which may include using alternative equipment or not using the equipment's vibratory features.

If the project area contains BLM lands, consult with the BLM realty specialist and district archeologist assigned to the project. However, it is under the discretion of the BLM and the permitted individual for the level of effort. Consultation on this effort should begin at the start of the environmental analysis of the proposed project.

Additionally, it is recommended that no modifications be made to any irrigation ditch structure as part of this project. Consultation with EBID is advised early in the environmental process. If any construction enters the right-of-way of either the lateral or drain, the EBID must be notified to obtain permission as well as instructions to conduct any construction activity.

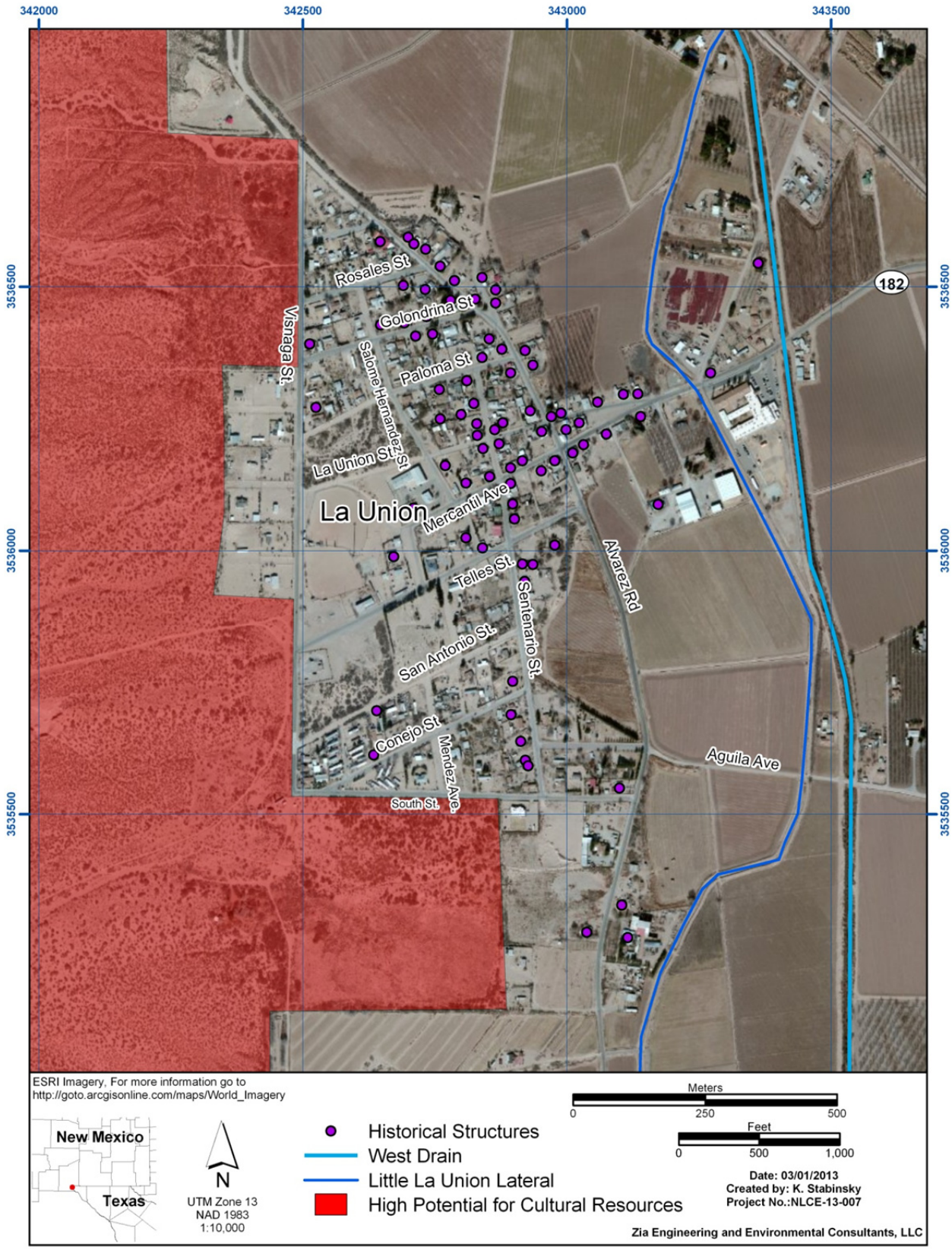

Figure 7. Historical and Cultural Properties Map

For consultation, contact the following:

Jan Biella, Deputy State Historic Preservation Officer
New Mexico State Historic Preservation Office
Department of Cultural Affairs
Bataan Memorial Building
407 Galisteo Street, Suite 236
Santa Fe, NM 87501
Phone: 505.827.4045
Email: jan.biella@state.nm.us

Bureau of Land Management
Las Cruces District Office
1800 Marquess Street
Las Cruces, NM 88005-3370
Phone: 575.525.4300
Fax: 575.525.4412

Elephant Butte Irrigation District, Main Office
530 South Melendres St
Las Cruces, NM 88005
Phone: 575-526-6671

2.4 NATURAL RESOURCES

The project area is located within the Rio Grande Floodplain ecoregion of the Chihuahuan Deserts region (Griffith, et al 2006) (Figure 8). The hydrology of this ecoregion has been impacted by the Elephant Butte Dam and the Caballo Lake north of the project area due to a reduction in annual flooding. The area's main land use is agricultural through the use of irrigation conveyances. Areas within this ecoregion contain riparian woodlands and scrublands that have been overgrown with salt cedar.

Other areas contain narrow bands of cropland, orchards, vineyards, and small farms (Griffith, et al 2006). Dick-Peddie (1993) described the general vegetation of the project area as Urban, Farmland and Open Water, areas disturbed through urban development, grazing by livestock, agriculture, and areas under water management (Dick Peddie 1993).

The Lower Rio Grande region tends to be semi-arid through most of the year with average rainfall measuring approximately 8.97 inches (22.8 centimeters). Most rainfall occurs within August with approximately 2.12 inches (5.4 centimeters) of precipitation. Maximum average temperatures are in the 80's° Fahrenheit (F) (26.7-32.2° Celsius [C]) and average minimum temperature is in the 40's°F (4.4-9.9°C). (IDcide.com 2013)

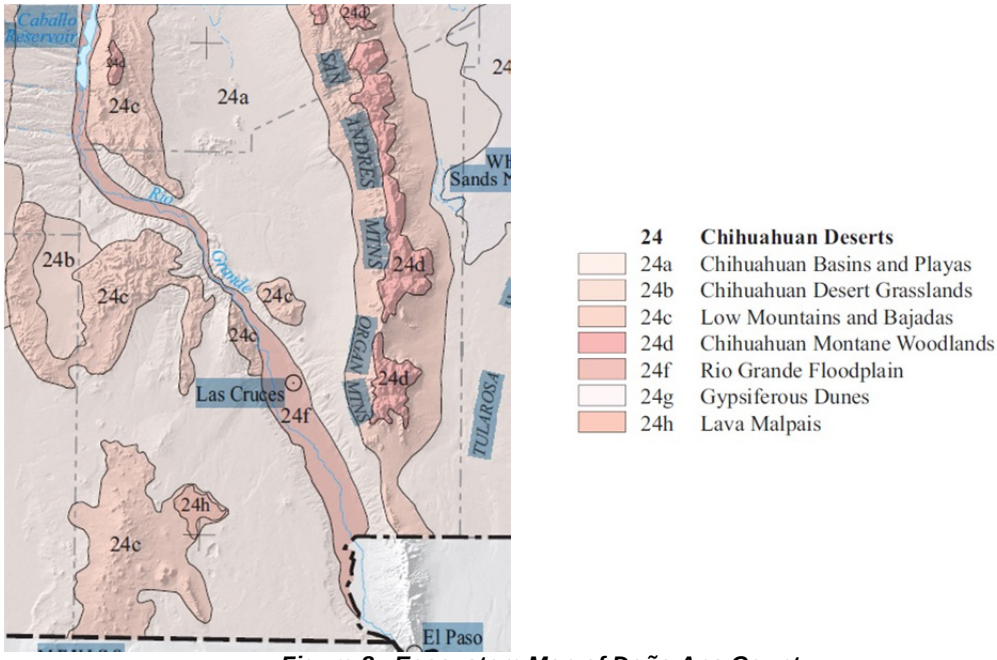

Figure 8. Ecosystem Map of Doña Ana County

2.4.1 Threatened and Endangered Species

Under the Endangered Species Act of 1973, the New Mexico Wildlife Conservation Act of 1978, and other agency regulations, threatened and endangered species (TES) are subject to protection from impacts associated with construction projects. Protection varies depending upon the State or Federal listing status of each species.

An endangered listing provides Federal and/or State protection for any species in danger of extinction throughout all or a significant portion of their range. A threatened listing provides protection for species which are likely to become endangered within the foreseeable future through all or a significant portion of their range. Take of Federally-listed or State-listed endangered or threatened species may result in fines and imprisonment if the action occurs without appropriate permits.

Federal Species of Concern (SOC) are included for planning purposes only and include taxa for which further information is needed to resolve their conservation status. Federal SOC are often also listed by the state or other agencies as Sensitive or SOC.

Sensitive species are those for which an agency (New Mexico Department of Game & Fish [NMDGF], United States Fish and Wildlife Service (USFWS), New Mexico Rare Plant Technical Council [NMRPTC]) has conservation concerns and recommends avoidance of unnecessary impacts to the species on lands managed by that agency. Legal protection does not extend to SOC or sensitive species, but failure to consider those species in project planning may result in project delays. Protection is warranted only to keep the population from becoming legally listed as threatened or endangered.

Extirpated species (by USFWS and NMDGF) are no longer known to occur in areas that they previously inhabited, but in some cases may actually occur or there is potential to re-establish them. Candidate species are those for which data has been presented to USFWS in support their being listed as threatened or endangered, but the process of listing has not yet gone to completion or is on hold for various reasons.

Zia compared habitat available in the proposed project area with the habitat requirements for the listed TES plant and wildlife species that may occur in Doña Ana County. Of the species listed in Appendix B, those that may have suitable habitat within the project area are listed below (Appendix C; NMDGF 2013, USFWS 2012, NMRPTC 1999). Additionally, Doña Ana County does not contain designated critical habitat for any threatened or endangered species (USFWS 2013b) (Figure 9).

Figure 9. Critical Habitat Map
If the area contained critical habitat, the area would be highlighted in red. (USFWS 2013)

<u>*Plants*</u>

- *Opuntia arenaria* (dune prickly pear) – New Mexico Endangered, USFWS Species of Concern

  The dune prickly pear is found in sandy areas, particularly semi-stabilized sand dunes within open Chihuahuan desert scrub that often includes honey mesquite and a sparse cover of grasses (NMRPTC 1999). The prickly pear is known to grow at elevations of 3,800-4,300 ft (1,160-1,300m).

- *Peniocereus greggii* var. *greggii* (night-blooming cereus) – New Mexico Endangered, USFWS Species of Concern

  The night-blooming cereus is found mostly in sandy to silty gravelly soils in gently broken to level terrain in desert grassland or Chihuahuan desert scrub (NMRPTC 1999). The project area contained habitat similar to that described by the NMRPTC.

Insects

- *Lytta mirifica* (Anthony blister beetle) – USFWS Species of Concern, BLM Sensitive

  The beetle is known to inhabit potatoes, tomatoes, beets, clover, and other plants (NMDGF 2009).

Reptiles

- *Phrynosoma cornutum* (Texas horned lizard) – BLM Sensitive

  The Texas horned lizard requires flat and semi-open areas for foraging. They are known to inhabit desert scrub and farmlands which are located within the project area. This species may avoid the project area during construction; however, hand relocation of the species should be done if encountered.

Birds

- *Athene cunicularia hypugaea* (burrowing owl) – USFWS Species of Concern, BLM Sensitive

  Burrowing owls can be found in disturbed as well as undisturbed areas. The NMDGF have special guidelines for construction activities if a burrowing owl burrow is identified within the construction area (Appendix C)

- *Columbina passerina pallescens* (common ground-dove) – New Mexico Endangered

  The common ground-dove is a ground nesting species within desert scrub areas. Although individual birds have been reported recently in the Las Cruces area, the common ground-dove is rarely observed in Doña Ana County and is locally abundant only in Hidalgo County approximately 126 miles (203 km) from the project area.

- *Lanius ludovicianus excubitorides* (loggerhead shrike) – BLM Sensitive, New Mexico Sensitive

  Loggerhead shrikes are known to be seen and nest within farmlands as well as desert scrub habitats that contain honey mesquite and four-wing saltbush.

Mammals

- Spilogale gracilis (western spotted skunk) – New Mexico Sensitive

  Habitat within the vicinity of the project area, particularly areas closer to the Rio Grande, may be utilized by the western spotted skunk. They are known to inhabit riparian areas (NMDGF 2010). Although riparian areas were not observed within the project area, the Rio Grande is located approximately three miles (4.8 km) from the project area. This species may pass through the project area, but would avoid areas of construction until construction activities have ceased.

2.4.2 Migratory Birds

Migratory birds are known to pass through and nest within and adjacent to the project area. If construction occurs during the nesting season (March through September), pre-construction surveys, as required by the USFWS under the Migratory Bird Treaty Act, should be conducted for active nests within the project area. Active nests would need to be marked and avoided until young have fledged and left the nest.

2.4.3 Recommendations

Biological surveys are highly recommended especially within the non-disturbed areas. Consultation should also be done with the NMDGF and USFWS. If no TES species are observed within the project area, the USFWS may not respond to consultation efforts. However, consultation should be conducted whether a species is encountered or not.

For consultation, contact the following:

Jim Lane, Director
New Mexico Department of Game and Fish
P. O. Box 25112
Santa Fe, NM 87504

Wally Murphy, Field Office Supervisor
U.S. Fish & Wildlife Service
2105 Osuna NE
Albuquerque, NM 87113
Email: Wally_Murphy@fws.gov

NMDGF has issued guidelines for avoidance/mitigation of impacts to burrowing owls (Appendix C). Those guidelines must be followed if burrowing owls are discovered in the project area during construction.

The NMDGF recommends following their trenching guidelines (2003) during the construction of open trenches that could potentially trap small mammals, amphibians, and reptiles or could potentially cause injury to larger mammals. Periods of highest activity for many of these species include night time, summer months, and wet weather. Below is an excerpt of the guidelines from the NMDGF (Appendix C).

- To minimize the amount of open trenches at any given time, keep trenching and back-filling crews close together.
- Trench during the cooler months (October – March). However, there may be exceptions (e.g., critical wintering areas) which need to be assessed on a site-specific basis.
- Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 90 meters. Escape ramps can be short lateral trenches sloping to the surface or wooden planks extending to the surface. The slope should be less than 45 degrees (100%). Trenches that have been left open overnight, especially where endangered species occur, should be inspected and animals removed prior to back-filling.

If construction efforts comply with these guidelines, where they apply, impacts to wildlife species would be reduced.

2.5 WETLANDS

Sections 404 and 401 of the Clean Water Act (CWA) provide for protection of wetlands and jurisdictional waters of the United States as defined by the USACE and the EPA. Executive Order 11990 was created to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands" (1977b). As a result, federal agencies are to consider alternatives that prevent impact to wetlands or minimize damage, if possible.

In the USFWS National Wetland Inventory (NWI) Map, the La Union area contains three locations of freshwater ponds (Figure 10). If these areas are proposed to be impacted consultation recommendations from both the USFWS and the U.S. Army Corps of Engineers is advised. However, avoidance is the best mitigation measure option.

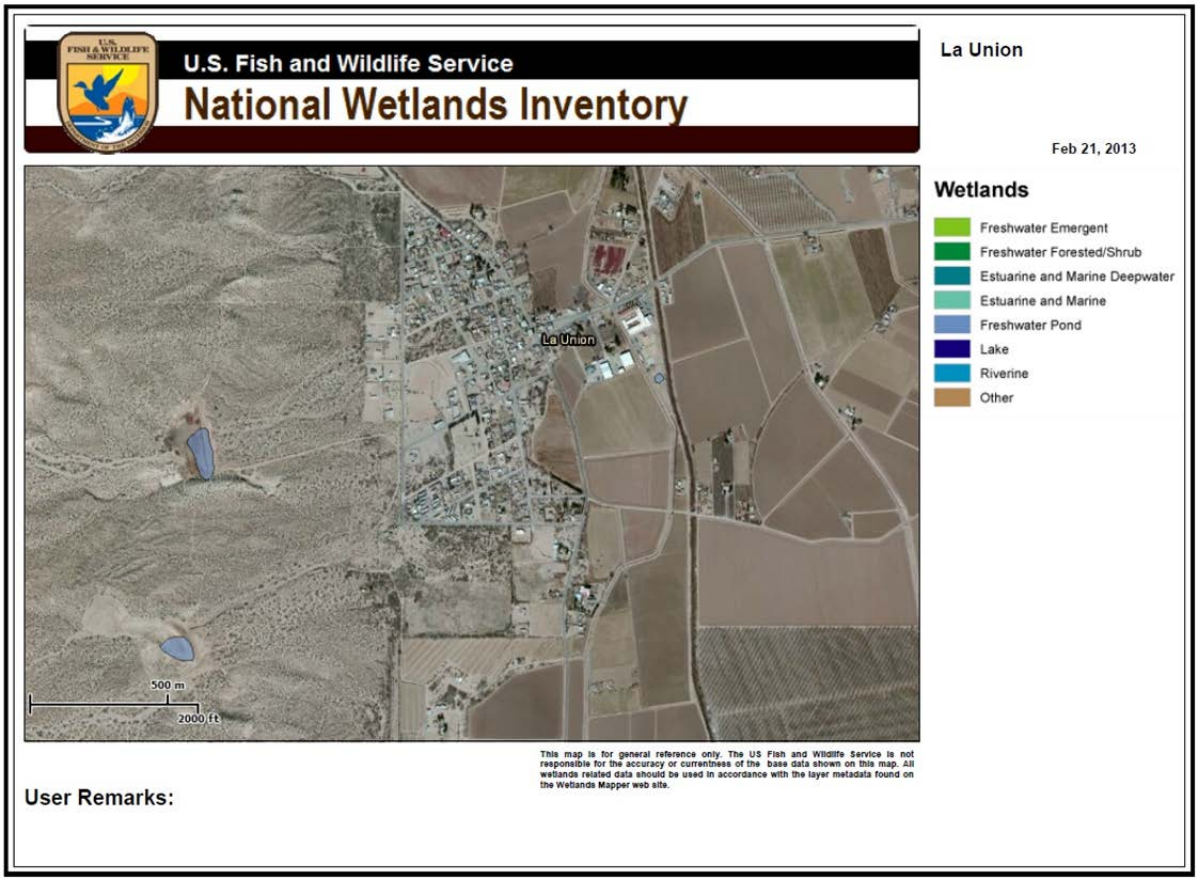

Figure 10. National Wetlands Inventory Map
(USFWS 2013a)

2.5.1 Recommendation

The best option is to avoid impacting either of these three areas where freshwater ponds are identified on the NWI Map (Figure 10). If this cannot be accomplished, early consultation efforts with the USFWS and the USACE are strongly advised.

For consultation, contact the following:

George Dennis, Branch Chief
USFWS Region 2,
New Mexico Ecological Services Field Office
Aquatic Ecosystems Branch
2105 Osuna NE
Albuquerque, NM 87113
Phone: 505.761.4754

U.S. Army Corps of Engineers,
Albuquerque District
Attention: CESPA-RD
4101 Jefferson Plaza NE
Albuquerque, NM 87109-3435
Phone: 505.342.3283
Fax: 505.342.3498

2.6 AIR QUALITY

The United States Environmental Protection Agency (EPA) under the Clean Air Act (CAA) has established standards for maintaining ambient air quality. La Union, New Mexico lies within EPA Region 6 (Figure 11). Air pollution occurs when pollutant materials exceed the standards set for a region. Air pollution has the capacity to cause physical harm to a human being. Pollutant materials can be broken up into six groups: ozone (O3), particulate material (PM), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), and lead (Pb). Under the CAA, EPA is required to establish a National Ambient Air Quality Standard (NAAQS) for each of the six pollutant groups.

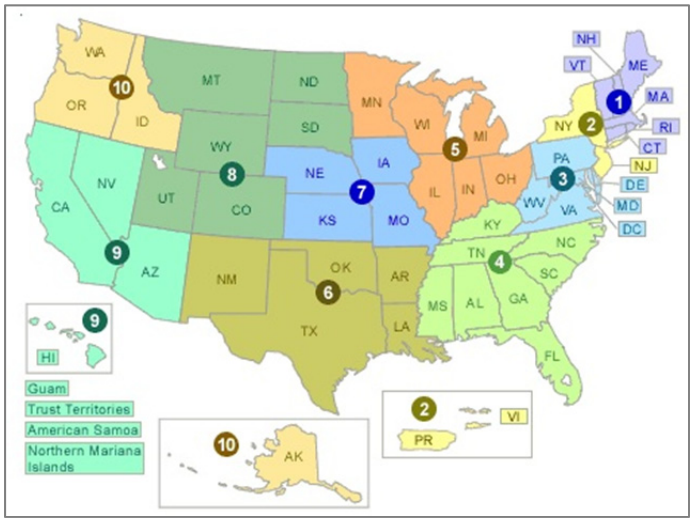

Figure 11. EPA Region Map
(EPA 2013)

The New Mexico Environment Department (NMED) has created statewide ambient air quality standards (NMAC 20.2.3) which must be met. In 2008, La Union and other neighboring communities were designated as being in nonattainment for the new 8-hour ozone standard. However, the EPA has not acted on NMED's recommendation of nonattainment due to the EPA's reconsideration of the levels for the 8-hour ozone standard. Additionally, in 1991, Anthony, New Mexico was in nonattainment for particulate matter 10 microns or less (PM10). It is unknown if the area has been cleared of this nonattainment status. Based on the NMED website, Doña Ana County does not appear to be in violation of any other air quality issue.

A Natural Events Action Plan (NEAP) has been prepared for Doña Ana County and approved by the EPA. As part of the NEAP, a dust control ordinance was adopted by Doña Ana County (Doña Ana County Ordinance No. 194-2000) to ensure air quality standards are met and dust control measures are in place.

2.6.1 Recommendation

Consultation with the NMED Air Quality Bureau is advised. Their response would have additional recommendations or state other violations. Additionally, dust preventative measures must be considered as part of the construction mitigation measures. Efforts may include water suppression, chemical aides, etc. to minimize fugitive dust during construction.

Per previous consultation letters from the NMED Air Quality Bureau for similar and other local projects, the following measures must be taken to maintain proper air quality during and after construction.

- All asphalt, concrete, quarrying, crushing, and screening facilities contracted in conjunction with the proposed project must have current and proper air quality permits.
- Dust control measures will be used to minimize the release of particulates due to vehicular traffic and construction.
- Areas disturbed by the construction activities, within and adjacent to the project area will be reclaimed to avoid long-term problems with erosion and fugitive dust.

NMED Environmental Review (Air Quality Bureau is one of many departments consulted when consultation is conducted with NMED). For consultation, contact the following:

Morgan R. Nelson, Policy Analyst
New Mexico Environment Department
1190 S. St. Francis Drive
Santa Fe, New Mexico 87502
Phone: 505.827.2855
Email: morgan.nelson@state.nm.us

2.7 WATER QUALITY

2.7.1 Surface Water / Ground Water

Under the New Mexico Water Quality Act and the federal Clean Water Act, the state of New Mexico is required to adopt water quality standards to "protect the public health or welfare, enhance the quality of water, and are consistent with and serve the purposes of the New Mexico Water Quality Act and the federal Clean Water Act" (New Mexico Administrative Code [NMAC] 20.6.4).

Surface Water

La Union contains several natural waterways that lead to the major water source of the area, the Rio Grande. Additionally, there are two irrigation facilities located in and near the town: Little

La Union Lateral and West Drain. These irrigation facilities are managed by the Elephant Butte Irrigation District. Furthermore, the natural waterways and the water within the irrigation facilities are considered jurisdictional waterways by the USACE.

Ground Water

La Union is located within the Mesilla Bolson of the Rio Grande aquifer (Figure 12). According to a report #356, Chapter 7, the following excerpt explains explicitly the groundwater flows and depths of the Mesilla Bolson (Hawley, et. al. 2001).

> Groundwater within the Mesilla Valley fill is generally unconfined and typically moves southward down the valley at an average gradient of about 4 to 6 ft per mile; however, local-flow direction is influenced by nearby hydraulic conditions, such as the river, drains, canals, well pumpage, and heavily irrigated fields. The water table is approximately 10 to 25 ft below the land surface in much of the valley-floor area. Recharge to the valley-fill aquifer occurs primarily as vertical flow from the surface water system (river, canals, laterals, and drains) and irrigated cropland fields except in times of extreme drought. The inner-valley aquifer zone is, in turn, the major source of recharge to underlying and laterally adjacent basin fill of the Santa Fe Group. Most of the discharge from the valley fill occurs through evapotranspiration of irrigated crops, flow to drain system, and irrigation and industrial pumping. Transmissivity values range from 10,000 to 30,000 ft^2/d, hydraulic conductivities vary from 100 to 350 ft/d, and estimated specific yield is 0.2. Specific capacities of large production wells range from 10 to 217 gpm/ft of drawdown, with an average value of 69 gpm/ft of drawdown. The quality of the water generally reflects the quality of the surface-water system, ranging from about 500 mg/L TDS to over 1,000 mg/L TDS. At the extreme southern end of the Mesilla Valley, however, TDS values locally exceed 10,000 mg/L.

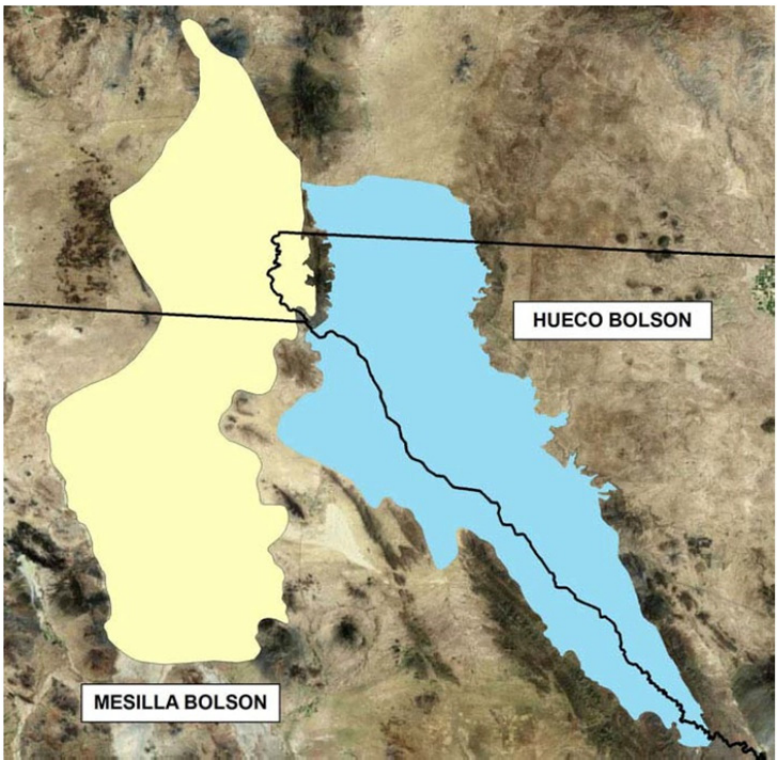

Figure 12. Mesilla Bolson Map
Franklin Mountains separate the two basins (El Paso Water Utilities 2013)

2.7.2 Recommendation

Consultation with NMED, EBID and USACE is strongly advised early in the environmental process. If any construction enters the right-of-way of either the lateral or drain, the EBID must be notified to obtain permission as well as instructions to conduct any construction activity.

For consultation, contact the following:

Elephant Butte Irrigation District, Main Office
530 South Melendres St
Las Cruces, NM 88005
Phone: 575-526-6671

Additionally, early consultation with the USACE is strongly recommended. Since La Union is in close proximity to the Rio Grande, a jurisdictional waterway, any surface water that drains (natural or manmade) can be considered a jurisdictional waterway. New construction that develops culverts, curbs, etc. that directs water may also be considered a jurisdictional waterway. Construction suggestions/drawings should be provided to the USACE for initial input in the direction and final resting spot for water within La Union.

For consultation, contact the following:

U.S. Army Corps of Engineers, Albuquerque District
Attention: CESPA-RD
4101 Jefferson Plaza NE
Albuquerque, NM 87109-3435
Phone: 505.342.3283
Fax: 505.342.3498

According to previous consultation letters provided by NMED for similar projects, the following bureaus typically advise that mitigation efforts follow the guidelines listed below:

<u>Ground Water Quality Bureau</u>
The Ground Water Quality Bureau recommends that heavy equipment utilized during construction be properly maintained to prevent the possibility of contamination by releases of fuel, hydraulic fluid, etc. It is also advised that construction efforts comply with NMAC 20.6.2.1203 Notification of Discharge-Removal. Complying with this notification would be expected to prevent impact to ground water quality in and within the vicinity of the project area.

<u>Surface Water Quality Bureau</u>
The Surface Water Quality Bureau typically state that the EPA requires a National Pollutant Discharge Elimination System (NPDES) permit for storm water discharges resulting from construction projects greater than one acre.

This permit would require that a Stormwater Pollution Protection Plan (SWPPP) be prepared and appropriate Best Management Practices be installed and maintained during and after construction. Furthermore, the permit would require that permanent stabilization measures and permanent storm water management measures be implemented after construction.

NMED Environmental Review (both Ground Water and Surface Water Bureaus are one of many departments consulted when consultation is conducted with NMED). For consultation, contact the following:

Morgan R. Nelson, Policy Analyst
New Mexico Environment Department
1190 S. St. Francis Drive
Santa Fe, New Mexico 87502
Phone: 505.827.2855
Email: morgan.nelson@state.nm.us

2.7.3 Floodplains

Executive Order 11988 (Floodplain Management) (1977a) requires Federal agencies to avoid direct or indirect impact of identified floodplains if a practical alternative is available. A floodplain is defined as a low plain area near a water source that is prone to periodic flooding. Two floodplains are typically defined, 100-year floodplain and 500-year floodplain. A 100-year floodplain is defined as an area that is prone to flooding with a one percent chance of flood occurrence any given year. A 500-year floodplain is an area that has a 0.2 percent chance of flood occurrence any given year.

Flood zones are defined by the Federal Emergency Management Agency (FEMA) as zones of flood risk. These are identified on flood insurance rate maps (FIRM) which have been created for flood management and flood insurance purposes.

La Union contains two flood zones (Figure 13): Zone X and Zone A. Zone X contains areas determined to be outside the 500-year floodplain. La Union consists mainly of areas noted as Zone X. Zone A contains areas with no determined base flood elevations. Zone A areas are also considered special flood hazard areas that are inundated by 100-year flood events. These areas are seen on the map associated with the arroyos or low lying areas closest to the Rio Grande.

2.7.4 Recommendation

Standard practices to avoid potential impact to floodplains should include confining all construction activities to the designated project area (road rights-of-way) during construction. It is also strongly advised that the Doña Ana Office of the Flood Commissioner be consulted. Past consultations for similar and other local projects, the flood commissioner has provided the following procedures during construction:

1. Sealed manhole covers in all flood zone areas and other low lying areas.
2. Ensure arroyos will not have adverse effects in the event of flash flooding that would compromise the structural integrity of the wastewater mains.

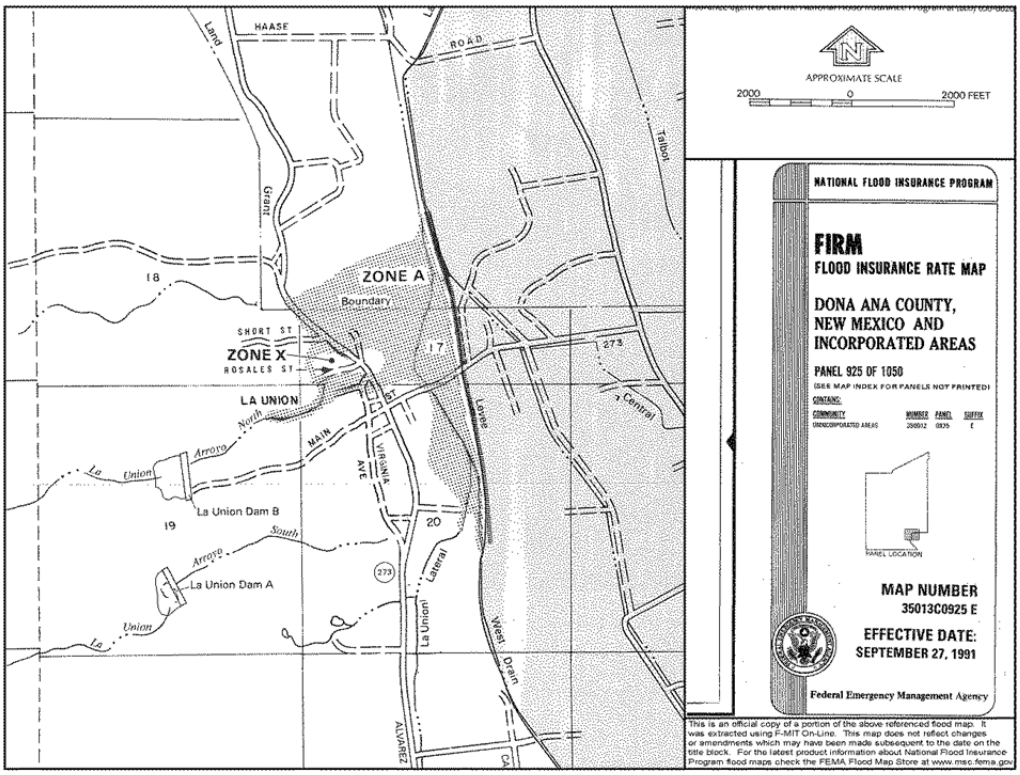

Figure 13. FEMA Flood Insurance Rate Map for La Union
(FEMA 1991)

For consultation, contact the following:

Doña Ana Office of the Flood Commissioner
Paul Dugie, Director
845 N. Motel Blvd.
Las Cruces, New Mexico 88007
Phone: 575.647.7256
Fax: 575.525.5567

2.8 SOCIOECONOMICS

The socioeconomics of La Union are those factors concerning the wealth and status of the population of the inhabitants. According to the EPA Environmental Justice Mapper, the town of La Union is 40 to 100 percent minority (Figure 14) and 10 to 20 percent are considered in poverty (Figure 15)

2.8.1 Recommendations

Project planning and construction should not negatively impact the livelihood of the residents of La Union. The final outcome of the project should not be a financial detriment to the residents or cause other financial or property harm.

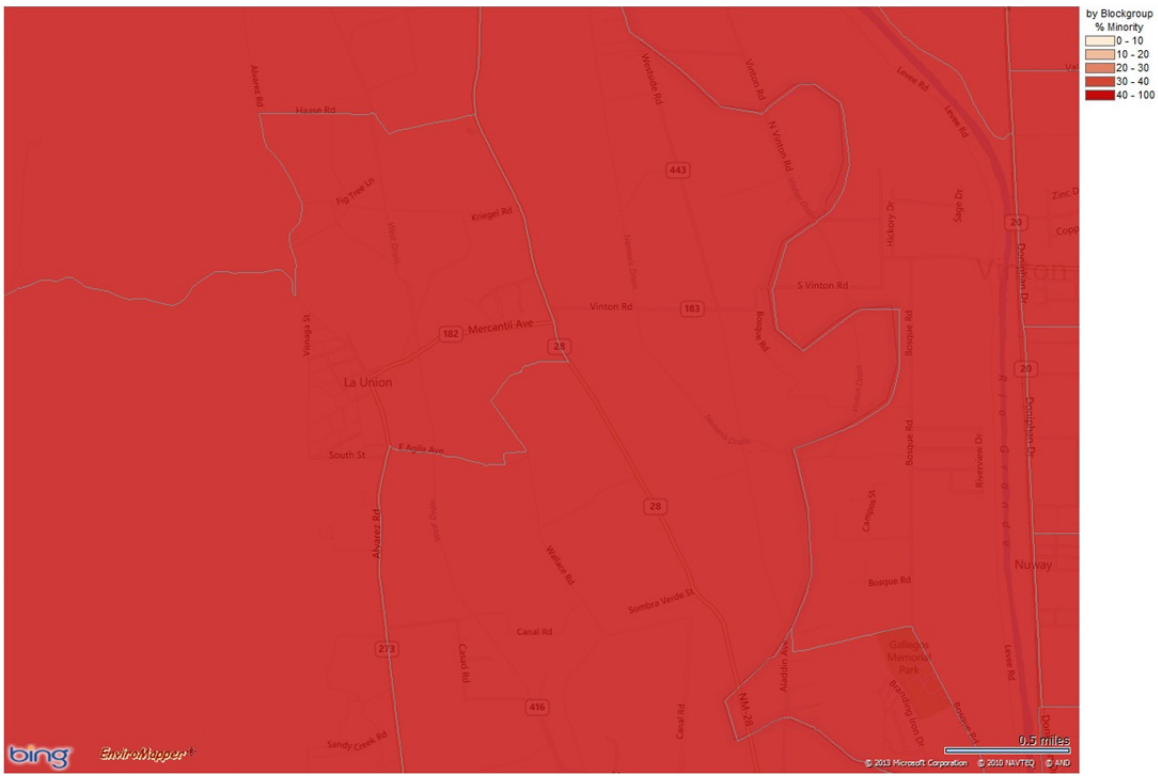

Figure 14. EPA Minority Map
(EPA 2013a)

Figure 15. EPA Poverty Map
(EPA 2013b)

2.9 ENVIRONMENTAL JUSTICE

In 1994, President Clinton signed Executive Order 12898 that mandates federal agencies to assess environmental justice for the proposed actions as part of their mission. The mission is to identify and address adverse health effects on minority and low-income communities due to a proposed action. The Executive Order also insures public involvement and access to information concerning any proposed action.

According to the U.S. EPA Environmental Justice Mapper, La Union does not contain hazardous materials areas within one mile. Additionally, the proposed action should not involve hazardous materials that would impact the health and well-being of the town of La Union.

2.9.1 Recommendation

Proper care and maintenance to all construction vehicles and generators should be conducted on a regular basis. Drip pans should also be used to prevent oil and/or hydraulic fluid leaks on the ground.

If construction equipment were to come in contact with a waterway, efforts should be made to prevent any leaking of oil and hydraulic fluids. If such events were to occur, proper clean-up and notification to the proper official should be conducted.

3.0 OTHER PERMITTING REQUIREMENTS

Doña Ana County may require construction permits. Additionally, if construction were to take place on New Mexico Department of Transportation (NMDOT) maintained roads, environmental surveys and reports will be required prior to obtaining a construction permit from them.

Early consultation efforts with Doña Ana County and NMDOT are highly recommended so all environmental surveys can be completed at the same time. Furthermore, early coordination with all federal and state agencies should be conducted early so that these environmental efforts are contain only one survey and report set for the entire project effort.

For consultation, contact the following:

Trent Doolittle, P.E., District Engineer
NMDOT, District 1
2912 E. Pine St.
Deming, NM 88030
Phone: 575.544.6530
Fax: 575.546.0272

4.0 CONCLUSION

Larkin is in the process of developing a Master Plan concerning drainage issues within the town of La Union, New Mexico. It was requested of Zia to conduct a full desktop environmental review of the entire town of La Union with the understanding that the final product suggested by Larkin may not include impacts to the entire town of La Union.

Within this environmental review, several actions are highly recommended at the beginning of the proposed construction project.

1. Coordination with all impacted agencies such as BLM, NMDOT, USACE, and EBID. This would also include funding agencies if funding is state or federal in origin.
2. Environmental surveys (Cultural and Natural Resources) must be conducted for all alternatives.
3. Other agency coordination as part of the environmental assessment effort should be conducted when all engineering alternatives have been identified and detailed.

It is also important to understand that all environmental effort takes time due to survey and reporting efforts as well as consultation and review of reports. If an environmental assessment is involved, assume the entire process which includes the environmental surveys to take at least six months.

For planning purposes, it is important to not rush the environmental process, so understand that each agency with impacted managed resources will have to review the reports. Furthermore, consultation letters require 30 days for a response. However, this should be conducted early so it should not add additional time to the process.

5.0 PREPARERS

The following report only contains a desktop environmental review. The review was conducted by the following Zia personnel.

Leah R. Markiewitz
Project Scientist / NEPA Specialist
Project Manager

Victoria T. Brown
Project Scientist / Historian

Victor R. Gibbs
Senior Scientist / Prinicpal Investigator / Archaeologist

Kenneth Stabinsky
Senior Scientist / GIS

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2013b Critical Habitat Mapper. http://criticalhabitat.fws.gov/. Accessed March 1, 2013.

APPENDIX A

Project Area Soils

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Dona Ana County Area, New Mexico

Ad—Adelino sandy clay loam

Map Unit Setting

Landscape: Piedmont slopes
Elevation: 3,800 to 4,200 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Adelino and similar soils: 85 percent

Description of Adelino

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed fine-loamy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Moderate (about 9.0 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Loamy (R042XA052NM)

Typical profile

0 to 10 inches: Sandy clay loam
10 to 21 inches: Sandy clay loam
21 to 80 inches: Sandy loam

Ag—Agua loam

Map Unit Setting

Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Agua and similar soils: 85 percent

Description of Agua

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Mixed stratified coarse-loamy alluvium over mixed sandy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Bottomland (R042XB018NM)

Typical profile

0 to 12 inches: Loam
12 to 23 inches: Loam
23 to 60 inches: Fine sand

Ao—Anapra clay loam

Map Unit Setting

Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 60 to 64 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Anapra and similar soils: 85 percent

Description of Anapra

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stratified fine-silty alluvium over mixed sandy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to slightly saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)

Typical profile

0 to 16 inches: Clay loam
16 to 28 inches: Clay loam
28 to 60 inches: Fine sand

Ar—Anthony-Vinton loams

Map Unit Setting

Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Anthony and similar soils: 50 percent
Vinton and similar soils: 30 percent

Description of Anthony

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stratified coarse-loamy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)

Typical profile

0 to 18 inches: Loam
18 to 60 inches: Fine sandy loam

Description of Vinton

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed sandy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)

Typical profile

0 to 16 inches: Loam
16 to 60 inches: Loamy fine sand

Bf—Belen clay loam

Map Unit Setting

Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Belen and similar soils: 85 percent

Description of Belen

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed clayey alluvium over mixed loamy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 3s
Land capability (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Clayey (R042XB023NM)

Typical profile

0 to 11 inches: Clay loam
11 to 26 inches: Silty clay
26 to 60 inches: Very fine sand

Bm—Bluepoint loamy sand, 1 to 5 percent slopes

Map Unit Setting

Landscape: Piedmont slopes

Elevation: 3,720 to 4,100 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition
Bluepoint and similar soils: 75 percent

Description of Bluepoint

Setting
Landform: Valley sides, alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Concave, convex
Across-slope shape: Linear, convex
Parent material: Wind-modified sandy alluvium

Properties and qualities
Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Low (about 4.8 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XB011NM)

Typical profile
0 to 12 inches: Loamy sand
12 to 60 inches: Loamy sand

Bn—Bluepoint loamy sand, 5 to 15 percent slopes

Map Unit Setting
Landscape: Piedmont slopes
Elevation: 3,720 to 4,300 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition
Bluepoint and similar soils: 75 percent

Description of Bluepoint

Setting

Landform: Alluvial fans, valley sides
Landform position (three-dimensional): Talf
Down-slope shape: Convex, concave
Across-slope shape: Convex, linear
Parent material: Wind-modified sandy alluvium

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XB011NM)

Typical profile

0 to 18 inches: Loamy sand
18 to 60 inches: Loamy fine sand

BP—Bluepoint-Caliza-Yturbide complex

Map Unit Setting

Landscape: Piedmont slopes
Elevation: 3,800 to 4,400 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Caliza and similar soils: 25 percent
Bluepoint and similar soils: 25 percent
Yturbide and similar soils: 20 percent

Description of Bluepoint

Setting

Landform: Valley sides, alluvial fans
Landform position (three-dimensional): Rise

Down-slope shape: Concave, convex
Across-slope shape: Linear, convex
Parent material: Wind-modified sandy alluvium

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XB011NM)

Typical profile

0 to 19 inches: Loamy sand
19 to 60 inches: Loamy sand

Description of Caliza

Setting

Landform: Alluvial fans, drainageways
Landform position (three-dimensional): Rise, talf
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Mixed sandy and gravelly alluvium

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Very low (about 2.6 inches)

Interpretive groups

Farmland classification: Not prime farmland

Land capability (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Gravelly Sand (R042XB024NM)

Typical profile

0 to 7 inches: Very gravelly sandy loam
7 to 12 inches: Very gravelly sandy loam
12 to 60 inches: Very gravelly sand

Description of Yturbide

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed sandy and gravelly alluvium

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 3.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 4s
Land capability (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XB011NM)

Typical profile

0 to 15 inches: Gravelly loamy sand
15 to 26 inches: Gravelly loamy sand
26 to 60 inches: Gravelly sand

Ge—Glendale loam

Map Unit Setting

Landscape: River valleys, uplands
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Glendale and similar soils: 85 percent

Description of Glendale

Setting

Landform: Terraces, flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stratified fine-silty alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: High (about 10.0 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 1
Land capability (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Bottomland (R042XB018NM)

Typical profile

0 to 12 inches: Loam
12 to 40 inches: Clay loam
40 to 60 inches: Very fine sandy loam

Gf—Glendale clay loam

Map Unit Setting

Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Glendale and similar soils: 85 percent

Description of Glendale

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stratified fine-silty alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: High (about 10.6 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 1
Land capability (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Bottomland (R042XB018NM)

Typical profile

0 to 12 inches: Clay loam
12 to 40 inches: Clay loam
40 to 60 inches: Very fine sandy loam

Hg—Harkey loam

Map Unit Setting

Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Harkey and similar soils: 85 percent

Description of Harkey

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stratified coarse-silty alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: High (about 9.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 1
Land capability (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)

Typical profile

0 to 18 inches: Loam
18 to 38 inches: Very fine sandy loam
38 to 60 inches: Silt loam

Pa—Pajarito fine sandy loam

Map Unit Setting

Landscape: Piedmont slopes
Elevation: 3,750 to 4,200 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Pajarito and similar soils: 85 percent

Description of Pajarito

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed coarse-loamy alluvium

Properties and qualities

Slope: 1 to 3 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Sandy (R042XB012NM)

Typical profile
0 to 12 inches: Fine sandy loam
12 to 28 inches: Fine sandy loam
28 to 60 inches: Fine sandy loam

RF—Riverwash-Arizo complex

Map Unit Setting
Landscape: Valleys
Elevation: 3,700 to 4,400 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 190 to 230 days

Map Unit Composition
Riverwash, gravelly: 45 percent
Arizo and similar soils: 35 percent

Description of Riverwash, Gravelly

Setting
Landform: Drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed sandy and gravelly alluvium

Properties and qualities
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum: 2.0
Available water capacity: High (about 9.6 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 8
Hydrologic Soil Group: D

Typical profile
0 to 18 inches: Gravelly loam
18 to 60 inches: Very fine sandy loam

Description of Arizo

Setting
Landform: Arroyos, valley floors
Landform position (three-dimensional): Talf
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Parent material: Mixed sandy and gravelly alluvium

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water capacity: Very low (about 2.0 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: Gravelly Sand (R042XB024NM)

Typical profile
0 to 12 inches: Gravelly loamy sand
12 to 60 inches: Very gravelly loamy sand

Vg—Vinton variant sandy clay loam

Map Unit Setting
Landscape: River valleys
Elevation: 3,700 to 4,120 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 62 degrees F
Frost-free period: 180 to 220 days

Map Unit Composition

Vinton variant and similar soils: 85 percent

Description of Vinton Variant

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed sandy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)

Typical profile

0 to 16 inches: Sandy clay loam
16 to 33 inches: Fine sand
33 to 60 inches: Clay

Data Source Information

Soil Survey Area: Dona Ana County Area, New Mexico
Survey Area Data: Version 10, Sep 24, 2009

APPENDIX B

Threatened and Endangered Species Lists

Biota Information System Of New Mexico

Providing New Mexico and its wildlife Year-round Excellent Service

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Database Query

Your search terms were as follows:

55 species returned.

Taxonomic Group	# Species	Taxonomic Group	# Species
Reptiles	4	Crustaceans	1
Birds	29	Coleoptera; beetles	1
Mammals	18	Lepidoptera; moths and butterflies	1
Molluscs	1		

Export to Excel

speciesid	SpeciesLink	commonname	category	sciname	ITISCode	SpeciesPhoto	County	Status
030046	**Lizard, Earless, Bleached**	Lizard, Earless, Bleached		Holbrookia maculata ruthveni (NM)	208811		Dona Ana	State NM: Sensitive taxa (informal)
030056	**Lizard, Fence, Southwestern**	Lizard, Fence, Southwestern		Sceloporus cowlesi	683043		Dona Ana	State NM: Sensitive taxa (informal)
030070	**Lizard, Horned, Texas**	Lizard, Horned, Texas		Phrynosoma cornutum	173938		Dona Ana	BLM Sensitive: NM State Office (NMSO)
030511	**Whiptail, White, Little**	Whiptail, White, Little		Aspidoscelis gypsi		no photo	Dona Ana	State NM: Sensitive taxa (informal)
040040	**Black-Hawk, Common**	Black-Hawk, Common		Buteogallus anthracinus anthracinus (NM)	175403		Dona Ana	Federal: FWS Species of Concern State NM: Threatened
040125	**Bunting, Varied**	Bunting, Varied		Passerina versicolor versicolor (NM);dickeyae (NM)			Dona Ana	State NM: Threatened
040195	**Cormorant, Neotropic**	Cormorant, Neotropic		Phalacrocorax brasilianus	554375		Dona Ana	State NM: Threatened

040250	**Cuckoo, Yellow-billed**	Cuckoo, Yellow-billed		Coccyzus americanus occidentalis (western pop)			Dona Ana	Federal: Candidate State NM: Sensitive taxa (informal)
040370	**Eagle, Bald**	Eagle, Bald		Haliaeetus leucocephalus alascanus (NM)	175422		Dona Ana	State NM: Threatened
040380	**Falcon, Aplomado**	Falcon, Aplomado		Falco femoralis septentrionalis (NM)	175611		Dona Ana	Federal: Endangered Federal: Nonessential Experimental Population State NM: Endangered
040384	**Falcon, Peregrine**	Falcon, Peregrine		Falco peregrinus anatum	175605		Dona Ana	Federal: FWS Species of Concern State NM: Threatened
040385	**Falcon, Peregrine, Arctic**	Falcon, Peregrine, Arctic		Falco peregrinus tundrius	175608	no photo	Dona Ana	Federal: FWS Species of Concern State NM: Threatened
040521	**Flycatcher, Willow, SW.**	Flycatcher, Willow, SW.		Empidonax traillii extimus	712529		Dona Ana	Federal: Critical Hab. Designated (NM) Federal: Endangered State NM: Endangered
040610	**Goshawk, Northern**	Goshawk, Northern		Accipiter gentilis atricapillus (NM,AZ);apache (NM,AZ)		no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Sensitive taxa (informal)
040690	**Ground-dove, Common**	Ground-dove, Common		Columbina passerina pallescens (NM)	177154		Dona Ana	State NM: Endangered
040805	**Hawk, Ferruginous**	Hawk, Ferruginous		Buteo regalis	175377		Dona Ana	BLM Sensitive: NM State Office (NMSO)
040905	**Hummingbird, Broad-billed**	Hummingbird, Broad-billed		Cynanthus latirostris magicus (NM)	178074		Dona Ana	State NM: Threatened
040925	**Hummingbird, Costa's**	Hummingbird, Costa's		Calypte costae	178035		Dona Ana	State NM: Threatened

040950	**Hummingbird, Violet-crowned**	Hummingbird, Violet-crowned		Amazilia violiceps ellioti (NM)	693655		Dona Ana	State NM: Threatened
040970	**Ibis, White-faced**	Ibis, White-faced		Plegadis chihi	174926		Dona Ana	BLM Sensitive: NM State Office (NMSO)
041235	**Nightjar, Buff-collared**	Nightjar, Buff-collared		Caprimulgus ridgwayi ridgwayi (NM)	687300	no photo	Dona Ana	State NM: Endangered
041315	**Owl, Boreal**	Owl, Boreal		Aegolius funereus	177938	no photo	Dona Ana	State NM: Threatened
041320	**Owl, Burrowing**	Owl, Burrowing		Athene cunicularia hypugaea (NM,AZ)	687093		Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern
041375	**Owl, Spotted, Mexican**	Owl, Spotted, Mexican		Strix occidentalis lucida (NM,AZ)	177928		Dona Ana	Federal: Critical Hab. Designated (NM) Federal: Threatened State NM: Sensitive taxa (informal)
041400	**Pelican, Brown**	Pelican, Brown		Pelecanus occidentalis carolinensis (NM)	174687		Dona Ana	State NM: Endangered
041475	**Pipit, Sprague's**	Pipit, Sprague's		Anthus spragueii	178499	no photo	Dona Ana	Federal: Candidate
041500	**Plover, Mountain**	Plover, Mountain		Charadrius montanus	176522		Dona Ana	State NM: Sensitive taxa (informal)
041750	**Shrike, Loggerhead**	Shrike, Loggerhead		Lanius ludovicianus excubitorides (NM);sonoriensis (NM);gambeli (NM)			Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)
041785	**Sparrow, Baird's**	Sparrow, Baird's		Ammodramus bairdii	179339		Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Threatened

042050	**Tern, Black**	Tern, Black		Chlidonias niger surinamensis (NM)			Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern
042070	**Tern, Least**	Tern, Least		Sternula antillarum athalassos (NM)			Dona Ana	Federal: Endangered State NM: Endangered
042190	**Vireo, Bell's**	Vireo, Bell's		Vireo bellii arizonae (NM,AZ);medius (NM)			Dona Ana	Federal: FWS Species of Concern State NM: Threatened
042200	**Vireo, Gray**	Vireo, Gray		Vireo vicinior	179008		Dona Ana	State NM: Threatened
050025	**Bat, Big-eared, Townsend's, Pale**	Bat, Big-eared, Townsend's, Pale		Corynorhinus townsendii pallescens (NM,AZ)	203458		Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Sensitive taxa (informal)
050032	**Bat, Myotis, Arizona**	Bat, Myotis, Arizona		Myotis occultus	179988	no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)
050037	**Bat, Free-tailed, Big**	Bat, Free-tailed, Big		Nyctinomops macrotis	180086	no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)
050047	**Bat, Myotis, Fringed**	Bat, Myotis, Fringed		Myotis thysanodes thysanodes (NM,AZ)		no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)
050059	**Bat, Myotis, Long-legged**	Bat, Myotis, Long-legged		Myotis volans interior (NM,AZ)			Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)

050085	**Bat, Red, Western**	Bat, Red, Western		Lasiurus blossevillii	552512	no photo	Dona Ana	Federal: FWS Species of Concern State NM: Sensitive taxa (informal)
050093	**Bat, Myotis, Small-footed, W.**	Bat, Myotis, Small-footed, W.		Myotis ciliolabrum melanorhinus (NM,AZ)			Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)
050095	**Bat, Spotted**	Bat, Spotted		Euderma maculatum	180010		Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Threatened
050103	**Bat, Myotis, Yuma**	Bat, Myotis, Yuma		Myotis yumanensis yumanensis (NM,AZ)			Dona Ana	BLM Sensitive: NM State Office (NMSO) State NM: Sensitive taxa (informal)
050146	**Chipmunk, Colorado, Organ Mtns.**	Chipmunk, Colorado, Organ Mtns.		Neotamias quadrivittatus australis (NM)			Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Threatened
050240	**Fox, Red**	Fox, Red		Vulpes vulpes fulva (NM);macroura (NM)			Dona Ana	State NM: Sensitive taxa (informal)
050270	**Gopher, Pocket, Desert**	Gopher, Pocket, Desert		Geomys arenarius arenarius (NM)		no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Sensitive taxa (informal)
050496	**Muskrat, Pecos River**	Muskrat, Pecos River		Ondatra zibethicus ripensis (NM)		no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Sensitive taxa (informal)

050657	**Rat, Wood, White Sands**	Rat, Wood, White Sands		Neotoma micropus leucophaea		no photo	Dona Ana	Federal: FWS Species of Concern
050670	**Ringtail**	Ringtail		Bassariscus astutus arizonensis (NM,AZ);flavus (NM);yumanensis (AZ);nevadensis (AZ)			Dona Ana	State NM: Sensitive taxa (informal)
050681	**Sheep, Bighorn, Desert**	Sheep, Bighorn, Desert		Ovis canadensis mexicana (delisted pops)			Dona Ana	State NM: Threatened
050735	**Skunk, Hog-nosed, Common**	Skunk, Hog-nosed, Common		Conepatus leuconotus mearnsi (NM);venaticus (NM,AZ)		no photo	Dona Ana	State NM: Sensitive taxa (informal)
050747	**Skunk, Spotted, Western**	Skunk, Spotted, Western		Spilogale gracilis	552466	no photo	Dona Ana	State NM: Sensitive taxa (informal)
060370	**Talussnail, Dona Ana**	Talussnail, Dona Ana		Sonorella todseni	77892	no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern State NM: Threatened
070060	**Shrimp, Fairy, Moore's**	Shrimp, Fairy, Moore's		Streptocephalus moorei	83715	no photo	Dona Ana	State NM: Sensitive taxa (informal)
196870	**Beetle, Blister, Anthony**	Beetle, Blister, Anthony		Lytta mirifica	731719	no photo	Dona Ana	BLM Sensitive: NM State Office (NMSO) Federal: FWS Species of Concern
215995	**Butterfly, Viceroy, Obsolete**	Butterfly, Viceroy, Obsolete		Basilarchia archippus obsoleta (NM,AZ)		no photo	Dona Ana	Federal: FWS Species of Concern

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List of species by county for New Mexico:

Counties Selected: Dona Ana

Select one or more counties from the following list to view a county list:

Bernalillo
Catron
Chaves
Cibola
Colfax

View County List

Dona Ana County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
least tern	*Sterna antillarum*	Birds	E				P
northern aplomado falcon	*Falco femoralis septentrionalis*	Birds	E, EXPN				P
Rio Grande silvery minnow	*Hybognathus amarus*	Fishes	E				P
Sneed pincushion cactus	*Coryphantha sneedii var. sneedii*	Flowering Plants	E				P
southwestern willow flycatcher	*Empidonax traillii extimus*	Birds	E				P
yellow-billed Cuckoo	*Coccyzus americanus*	Birds	C				P

Last updated: December 17, 2012

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Home
About NMRPTC
Contacts
Rare Plant List
County List
Agency Status
Photo List
About the List
History of Changes
Species Considered, but dropped
Photographers, Illustrators and Authors
Image Usage Guidelines
Sponsors
Discussion Group
Useful Literature
Links

Results of County Search

DOÑA ANA	
Scientific name	County-NM
Agastache cana	Doña Ana, Grant, Luna, Sierra
Agastache pringlei var. verticillata	Doña Ana
Astragalus castetteri	Doña Ana, Sierra
Castilleja organorum	Doña Ana
Draba standleyi	Doña Ana, Otero, Sierra, Socorro
Escobaria organensis	Doña Ana
Escobaria sandbergii	Doña Ana, Sierra
Escobaria sneedii var. sneedii	Doña Ana
Escobaria villardii	Doña Ana, Otero
Hexalectris arizonica	Doña Ana, Hidalgo, Otero, Sierra
Hymenoxys vaseyi	Doña Ana, Sierra
Oenothera organensis	Doña Ana
Opuntia arenaria	Doña Ana, Luna, Socorro
Peniocereus greggii var. greggii	Doña Ana, Grant, Hidalgo, Luna
Penstemon alamosensis	Doña Ana, Lincoln, Otero
Perityle cernua	Doña Ana
Perityle staurophylla var. staurophylla	Doña Ana, Otero, Sierra
Polygala rimulicola var. mescalerorum	Doña Ana
Salvia summa	Chaves, Doña Ana, Eddy
Scrophularia laevis	Doña Ana
Silene plankii	Bernalillo, Doña Ana, Sandoval, Sierra, Socorro, Torrance

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APPENDIX C

New Mexico Department of Game and Fish Guidelines

TRENCHING GUIDELINES

NEW MEXICO DEPARTMENT OF GAME AND FISH

September 2003

Open trenches and ditches can trap small mammals, amphibians and reptiles and can cause injury to large mammals. Periods of highest activity for many of these species include nighttime, summer months and wet weather. Implementing the following recommendations can minimize loss of wildlife.

- Keep trenching and back-filling crews close together, to minimize the amount of open trenches at any given time.

- Trench during the cooler months (October – March). However, there may be exceptions (e.g., critical wintering areas) that need to be assessed on a site-specific basis.

- Avoid leaving trenches open overnight. Where trenches cannot be back-filled immediately, escape ramps should be constructed at least every 90 meters.
  Escape ramps can be short lateral trenches or wooden planks sloping to the surface. The slope should be less than 45 degrees (1:1). Trenches that have been left open overnight should be inspected and animals removed prior to backfilling, especially where endangered species occur.

On a statewide basis there are numerous threatened, endangered or sensitive species potentially at risk by trenching operations. Project initiators should seek county species list to evaluate potential impact of projects. Risk to these species depends upon a wide variety of conditions at the trenching site, such as trench depth, side slope, soil characteristics, season, and precipitation events.

GUIDELINES AND RECOMMENDATIONS
FOR BURROWING OWL
SURVEYS AND MITIGATION

NEW MEXICO DEPARTMENT OF GAME AND FISH

JULY 2007

(Note: Most of the following recommendations were developed by the New Mexico Burrowing Owl Working Group (2005), The California Burrowing Owl Consortium (1993), and The California Department of Fish and Game (1995))

The burrowing owl (*Athene cunicularia*) is considered a species of concern by the U.S. Fish and Wildlife Service and is protected by both the Migratory Bird Treaty Act and by New Mexico statute 17-2-14 (NMSA 1978). These guidelines are provided to assist in conducting burrowing owl surveys and mitigation during the preparation of environmental assessment reports and environmental impact statements. The guidelines also aid in the decision making process implemented when there is potential for any type of project to adversely affect burrowing owls or any of the resources that support them.

Project proponents should: 1) identify burrowing owl habitats and burrows; 2) choose and implement an appropriate survey method to confirm the presence of owls; and 3) determine and implement appropriate mitigation.

Step 1. Identify Burrowing Owl Habitat and Burrows

Seventy-five percent of New Mexico's ecological zones, as described by Dick-Peddie (1993), support or have the potential to support burrowing owls (Arrowood et al. 2001). These zones include: Chihuahuan desert scrub, closed basin scrub, desert grassland, Great Basin desert scrub, juniper savanna, lava beds, plains-mesa grassland, plains-mesa sand scrub, sand dunes, urban, and farmland (Arrowood et al. 2001). More specifically, burrowing owls generally are associated with dry, open, short-grass, treeless plains (Haug et al. 1993). Burrowing owls are also known to use areas that include shrubs such as creosote bush (*Larrea tridentata*), mesquite (*Prosopis* spp.), four-wing saltbush (*Atriplex canescens*), and rabbit-brush (*Chrysothanmus nauseous*) (Martin 1973, Botelho and Arrowood 1996). Burrowing owls also inhabit human-modified landscapes, such as golf courses and parking lots.

Burrowing owls rarely dig their own burrows and, therefore, depend in part upon the presence of burrowing animals. In New Mexico, burrowing owls are associated with Gunnison's prairie dogs (*Cynomys gunnisoni*), black-tailed prairie dogs (*C. ludovicianus*), American badgers (*Taxidea taxus*), ground squirrels (*Spermophilus* spp.), rock squirrels (*S. variegatus*), foxes (*Vulpes* spp.), and coyotes (*Canis latrans*). Burrowing owls and prairie dogs are included as species of greatest conservation need in the western great plain shortgrass prairie vegetation type (Comprehensive Wildlife Conservation Strategy for New Mexico 2006). Burrowing owls can also utilize human-made structures, such as, storm drains, berms, roadsides, irrigation canals, and artificial burrows specifically constructed for the owls.

Occupancy of suitable burrowing owl sites can be verified by observing at least one burrowing owl, or owl molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance (The California Burrowing Owl Consortium 1993).

Step 2. Choose and Implement an Appropriate Survey Method to Confirm Owl Presence

The most suitable time to survey for burrowing owls in New Mexico is during the nest initiation and incubation phases (Table 1). Most burrowing owls are migratory in the state, although some over-winter in New Mexico, particularly males in southern New Mexico (Arrowood et al. 2001, Johnson et al. 1997). Migratory owls typically arrive on the breeding grounds by March and remain there until October.

Table 1. General breeding chronology of the burrowing owl in New Mexico.

Location	**Pair Bonding/Nest Initiation**	**Egg Laying and Incubation**	**Chicks Fledge above Ground**	**Independence**
New Mexico	March to April	Late April to early June	Early-Mid June	Mid-Late July

Surveys should not be conducted in certain weather conditions when owls are more likely to be in their burrows and not visible, such as temperatures above 30°C (86°F) and winds exceeding 20 km/hr (approx. 12 mph). Surveys also should be restricted to the early morning and evening hours, because above ground activity is often higher during these times (Conway and Simon 2003).

A single survey on a proposed project site is adequate to determine the presence or absence of active burrows. If owls are not observed, all active burrows should be inspected for indications of use by the presence of owl pellets, droppings, or feathers. If active burrows are found follow-up survey, utilizing the methods described below, should be scheduled to confirm the presence or absence and numbers of owls on a project site.

Burrowing owl surveys can be accomplished effectively by either walking or driving transects. Either the entire length of the transect or point count stations along the transect can be surveyed, and surveys can be conducted with or without broadcasting audio burrowing owl alarm (*quick-quick-quick*) and/or male territory (*coo-coo*) calls. Studies have shown that broadcasting calls increases detection probability of burrowing owls (Haug and Didiuk 1993, Conway and Simon 2003) and that trained surveyors can detect owls up to 300 m (Conway and Simon 2003). These methods might need to be modified depending upon the terrain and equipment being used, which, respectively, affect the distance owls and the broadcasted vocalizations can be heard.

If burrowing owl habitat is found at the project site, a 150-m buffer zone around the project should also be assessed for potential burrowing owl habitat. At the project site, use one of the following survey methods as recommended by the New Mexico Burrowing Owl Working Group (NMBOWG).

METHOD 1: Walking Surveys

Without Audio Calls

Transects should be established in suitable owl habitat. A single, straight line should be walked for the entire length of the transect (for specific protocol and comparison of line transect methodology see Emlen 1971 and 1977). Observers should record all owls observed along either side of the line. If a more thorough estimate of abundance in a specific area is desired, an observer should walk multiple parallel lines (or many observers walk parallel lines concurrently) that are approximately 50 m apart. All owls observed along either side of the transect line should be recorded. Data recorded should include: date and time of survey, weather conditions, dominant vegetation, burrow aspect, survey location (including GPS coordinates), number of owls observed, sex and age classes of owls (if determinable), and presence of prairie dogs and other burrowing animals.

With Audio Calls

Observers should proceed along a transect line, stopping at points approximately every 200 m to broadcast owl vocalizations and listen for responses. Distance between points will depend upon terrain and broadcast system , which, respectively, affect the distance owls and the broadcasted vocalizations can be heard. If the broadcast system and owl response calls, can be heard up to 200 m. then the observer should stop every 200 m. The distance between observation points can be shortened if necessary. If a more thorough estimate of abundance is desired, the observer should walk multiple parallel lines (or many observers walk parallel lines concurrently) to cover a greater proportion of the area. The lines should be spaced according to the same distance of audio coverage. At each observation point, the observer should scan for any owls with binoculars for the first two minutes, after which a territorial and/or alarm calls should be played for one minute. Finally, there should be two additional minutes of scanning after broadcasting. Scanning and broadcasting should be done in a 360° arc. All owls detected during this five-minute observation period should be recorded. Data recorded should include: date and time of survey, weather conditions, dominant vegetation, burrow aspect, survey location (including GPS coordinates), number of owls observed, sex and age classes of owls (if determinable), and presence of prairie dogs and other burrowing animals.

METHOD 2: Roadside Point-count Surveys

Without Audio Calls
Routes should be established along roads in the project site. Observers should stop the vehicle and pull off the side of the road at 0.5-mile (0.8 km) intervals (if project site is large enough). If visibility is impaired at a point, observers should continue until the next immediate suitable surveying spot is reached. All surveyors should exit the vehicle at each point and scan with binoculars in a 360° arc for a total of five minutes. All owls detected during this five-minute observation period should be recorded. Data recorded should include: date and time of survey, weather conditions, dominant vegetation, burrow aspect, survey location (including GPS coordinates), number of owls observed, sex and age classes of owls (if determinable), and presence of prairie dogs and other burrowing animals.

With Audio Calls
Routes should be established along roads in the project site. Observers should stop the vehicle and pull off the side of the road at 0.5-mile (0.8km) intervals (if project site is large enough). If visibility is impaired at a point, observers should continue until the next immediate suitable surveying spot is reached. Observers should exit the vehicle at each point and scan for the first two minutes. Afterwards, owl calls (territorial and/or alarm) should be played for one minute, followed by two additional minutes of scanning. Scanning should be done with binoculars in a 360° arc. All owls detected during this five-minute observation should be recorded. Data recorded should include: date and time of survey, weather conditions, dominant vegetation, burrow aspect, survey location (including GPS coordinates), number of owls observed, sex and age classes of owls (if determinable), and presence of prairie dogs and other burrowing animals.

Step 3. Determine and Implement Appropriate Mitigation

The objectives of these mitigation guidelines are to minimize the negative impacts to burrowing owls at a project site and preserve habitat that will support burrowing owl populations into the future. The mitigation process begins with the survey protocol to document the presence of burrowing owl habitat, and to determine if burrowing owls use the project site and the surrounding buffer zone. Occupied burrows should be determined based on survey information. If more than 30 days elapse between the initial survey and construction activities, project sites and buffer zones with suitable habitat should be resurveyed to ensure no burrowing owls have occupied these areas in the interim period. Resurveying the project site should be conducted no more than 30 days prior to initial project initiation. If ground disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed.
If burrowing owls are present on a project site, the following mitigation measures should be followed to minimize negative impacts to burrowing owls, nest burrows and burrowing owl habitat.

According to the California Burrowing Owl Consortium there are three definitions of negative impacts:

- Disturbance or harassment within 50 m of occupied burrows.
- Destruction of burrows and burrow entrances. Burrows include structures such as culverts, concrete slabs and debris piles that provide shelter to burrowing owls.
- Destruction and/or degradation of foraging habitat adjacent to occupied burrows (within 100 m).

If burrowing owls are found at a project site, measures to avoid or mitigate negative impacts should follow one of three general approaches. These approaches are listed below:

1. Design and implement project activities to spatially avoid negative impacts and disturbance to burrowing owls and their habitat.

    - No disturbance should occur within 50 m of occupied burrows during the non-breeding season (September through February) or within 75 m during the breeding season (March through August). Avoidance also requires that a minimum of 6.5 acres of foraging habitat be maintained in undisturbed habitat condition for each pair or unpaired burrowing owl.
    - No disturbance or destruction of any prairie dogs or other burrowing animals or their burrows, should occur within the owl avoidance areas.

2. Design and implement project activities to seasonally avoid negative impacts and disturbances to burrowing owls.

    - Occupied burrows should not be disturbed during the nesting period, from March 1st through August 1st.
    - No disturbance or destruction of any prairie dogs or other burrowing animals or their burrows, should occur within the owl avoidance areas.
    - When destruction of burrows is unavoidable, burrow destruction or ground disturbing activities should only occur during the season when migratory owls have left the breeding site. The unoccupied season can be expected to begin in September or October and end in February or March. However, burrowing owl occupancy always must be confirmed by survey data, regardless of season. Immediately prior to burrow destruction a video probe should be used to confirm that the burrow is unoccupied.
    - For any occupied burrows that are destroyed outside of the nesting season, any remaining, undestroyed, burrows should be enhanced (enlarged or cleared of debris) or new burrows should be created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site. A minimum of 6.5 acres of foraging habitat should be maintained in an undisturbed habitat condition for each pair or unpaired resident bird.
    - To ensure compliance with the federal Migratory Bird Treaty Act and state laws and regulations, the U.S. Fish and Wildlife Service and New Mexico Department of Game and Fish must be contacted to confirm that any construction activities resulting in destruction of burrows will not result in a taking of burrowing owls and, thus, violation of federal and state law.

3. Relocate burrowing owls that will be negatively impacted by project activities to protected areas of potential burrowing owl habitat.

    - If owls must be moved away from the disturbance area, passive relocation techniques should be used rather than trapping. At least one or more weeks will be necessary to accomplish this and to allow the owls to acclimate to alternate burrows. Passive relocation can be accomplished by use of one-way doors. Owls should be excluded from burrows in the immediate negatively impacted zone and within a 50-m buffer zone by installing one-way doors in burrow entrances. One-way doors should be left in place for approximately 48 hours to ensure that owls have left burrows before excavation. Prior to burrow destruction a video probe should be used to confirm that the burrow is unoccupied. If a video probe is not available burrows should be excavated with hand tools to ensure that the burrows are unoccupied. Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. Passive relocation should only be used during the non-breeding season,. This method should not be used once a pair of owls is at a burrow unless it is determined that the female does not exhibit a brood patch.
    - If removal or relocation is necessary, trapped burrowing owls should be released in a new location with suitable habitat in a soft release cage. Soft release involves placing owls in a cage with an artificial burrow and fed mice daily for three weeks. After three weeks one side of the cage is removed. More information on this technique is available from NMBOWG.
    - A minimum of 6.5 acres of foraging habitat should be maintained in an undisturbed habitat condition for each pair or unpaired resident bird. No disturbance or destruction of any prairie dogs or other burrowing animals or their burrows, should occur within the owl avoidance areas.
    - To ensure compliance with the federal Migratory Bird Treaty Act and state laws and regulations, the U.S. Fish and Wildlife Service (505-248-7882) and New Mexico Department of Game and Fish (505-476-8101) must be contacted and federal and state permits must be obtained for handling of owls.

Links

New Mexico Burrowing Owl Working Group
http://www.hawksaloft.org/BUOW/BUOW.htm

Use of Artificial Burrows by Burrowing Owls at the HAMMER Facility on the U.S. Dept. of Energy Hanford Site
http://www.pnl.gov/main/publications/external/technical_reports/PNNL-15414.pdf

How to Install Artificial Nesting Burrows for Burrowing Owls
http://www.usga.org/turf/articles/environment/general/Burrowing-Owl-Brochure.pdf

Artificial Burrowing Owl Burrow Design
http://www2.ucsc.edu/scpbrg/artifici.htm

Literature Cited

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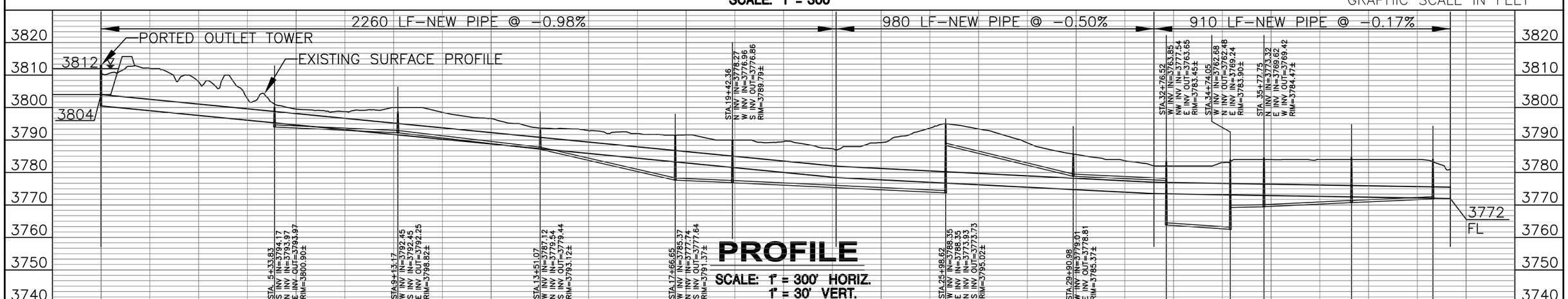
PLAN

SCALE: 1" = 300'

300 0 150 300

SCALE: 1"=300'
GRAPHIC SCALE IN FEET



PROFILE

SCALE: 1" = 300' HORIZ.
1" = 30' VERT.

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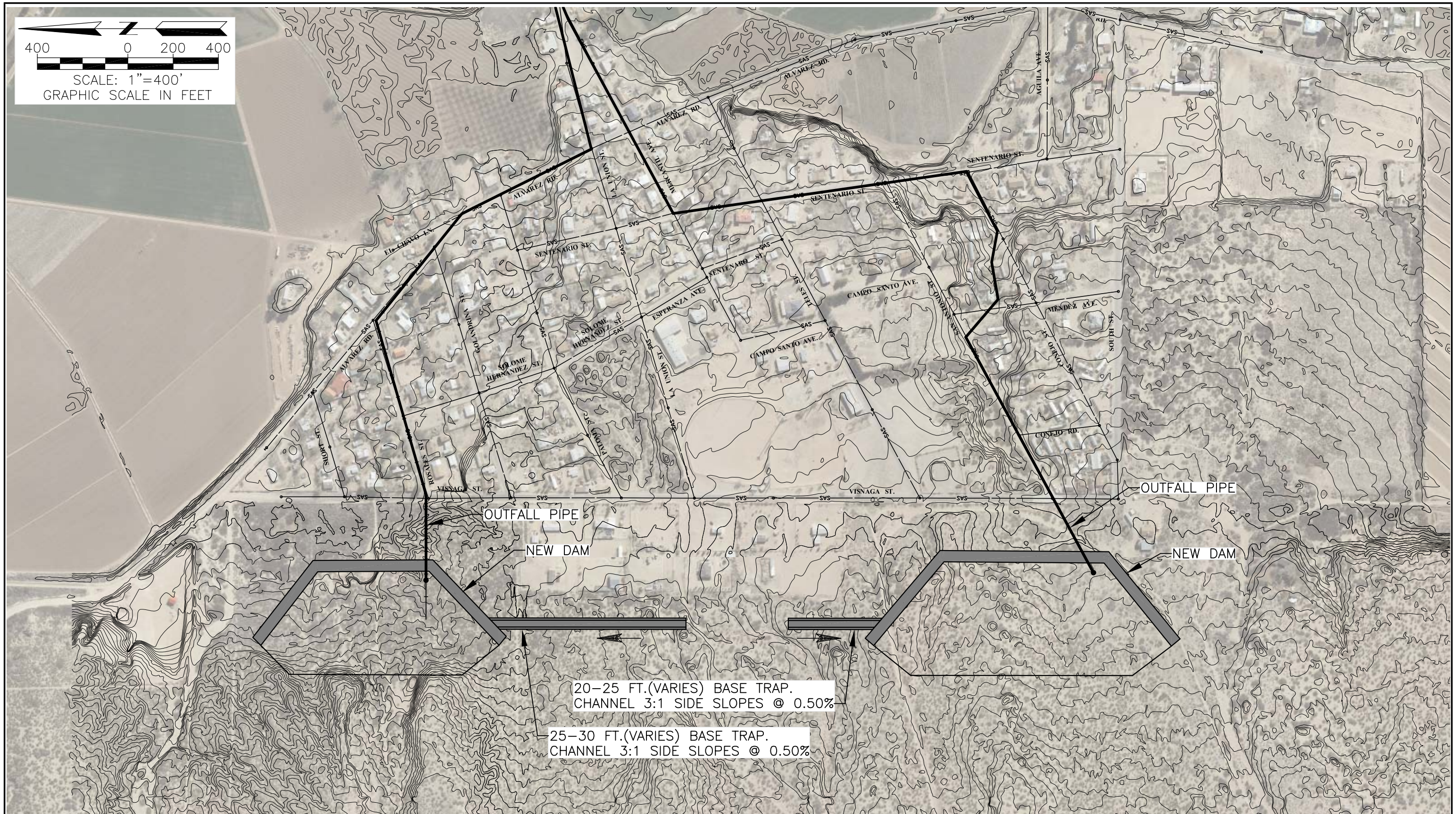
BY	DATE	DESCR.	SCALE	APPROVED	DVO

DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 10 SINGLE DAM PRELIMINARY PLAN & PROFILE OPTION 2



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REVISIONS				
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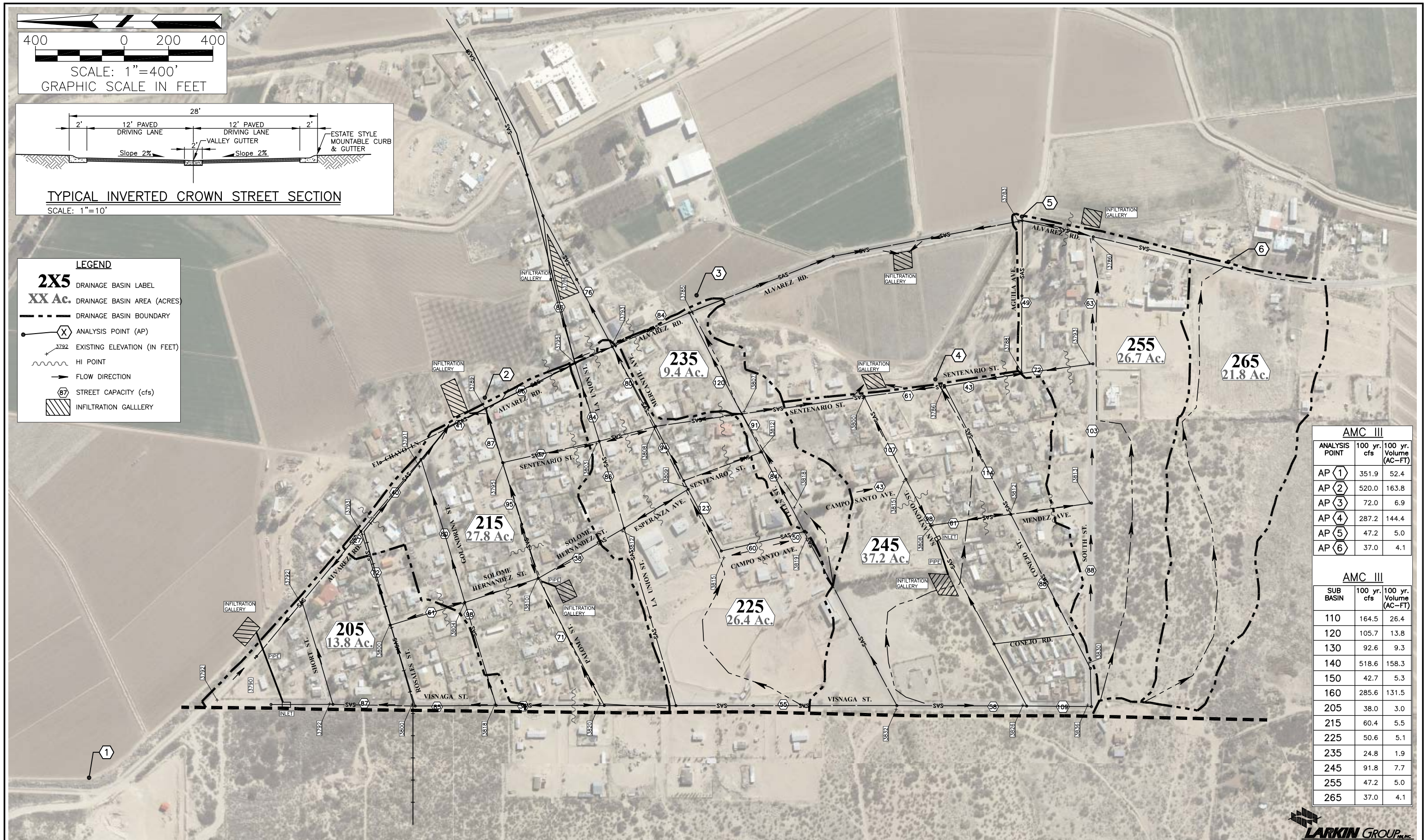
LA UNION MASTER DRAINAGE PLAN

Figure 11 ALTERNATIVE DAMS LAYOUT
OPTION 1



AMC III

ANALYSIS POINT	100 yr. cfs	100 yr. Volume (AC-FT)
AP 1	351.9	52.4
AP 2	520.0	163.8
AP 3	72.0	6.9
AP 4	287.2	144.4
AP 5	47.2	5.0
AP 6	37.0	4.1

AMC III

SUB BASIN	100 yr. cfs	100 yr. Volume (AC-FT)
110	164.5	26.4
120	105.7	13.8
130	92.6	9.3
140	518.6	158.3
150	42.7	5.3
160	285.6	131.5
205	38.0	3.0
215	60.4	5.5
225	50.6	5.1
235	24.8	1.9
245	91.8	7.7
255	47.2	5.0
265	37.0	4.1

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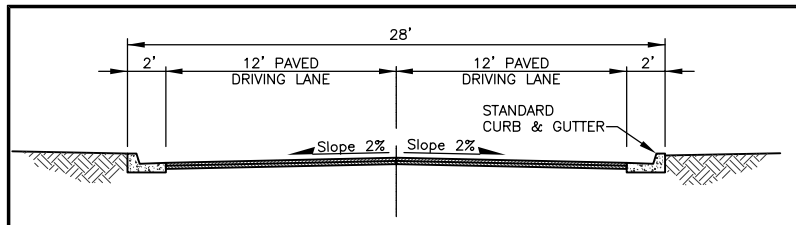
BY_____ DATE_____ DESCR._____
BY_____ DATE_____ DESCR._____

DATE_____ DRAWN GTM
SCALE_____ CHECKED DVO
APPROVED DVO

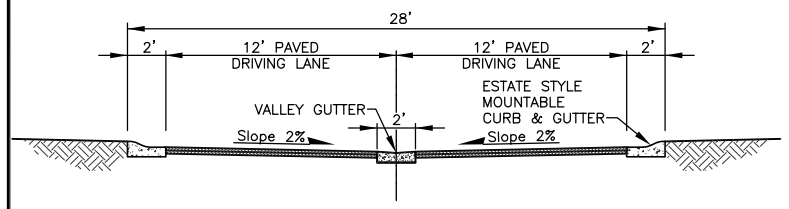
DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 12 PRELIMINARY STREET FLOW CAPACITIES



TYPICAL STREET SECTION

SCALE: 1"=10'



TYPICAL INVERTED CROWN STREET SECTION

SCALE: 1"=10'

LEGEND

- HI POINT
- FLOW DIRECTION
- TYPICAL CROWNED STREET
- INVERTED CROWN STREET
- CATTLE GUARD INLET
- DROP INLET W/PIPE
- INFILTRATION GALLERY
- FLOATABLE SEPARATION GALLERY

400 0 200 400

SCALE: 1"=400'

GRAPHIC SCALE IN FEET

LARKIN GROUP NM, INC.

CONSULTING ENGINEERS AND SURVEYORS

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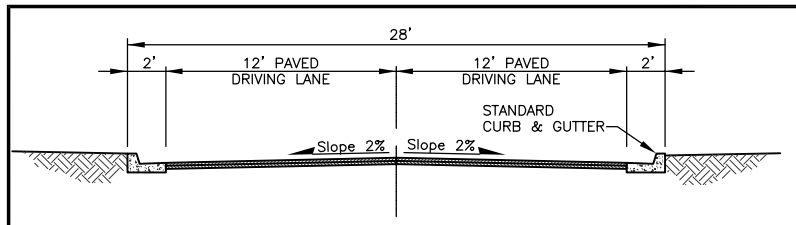
BY	DATE	DESCR.	SCALE	APPROVED	DVO

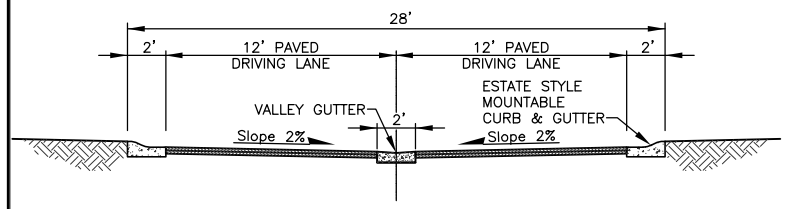
DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 13 PROPOSED STREET IMPROVEMENTS
ONE DAM OPTION



TYPICAL STREET SECTION

SCALE: 1"=10'



TYPICAL INVERTED CROWN STREET SECTION

SCALE: 1"=10'

LEGEND

- HI POINT
- FLOW DIRECTION
- TYPICAL CROWNED STREET
- INVERTED CROWN STREET
- CATTLE GUARD INLET
- DROP INLET W/PIPE
- INFILTRATION GALLERY
- FLOATABLE SEPARATION GALLERY

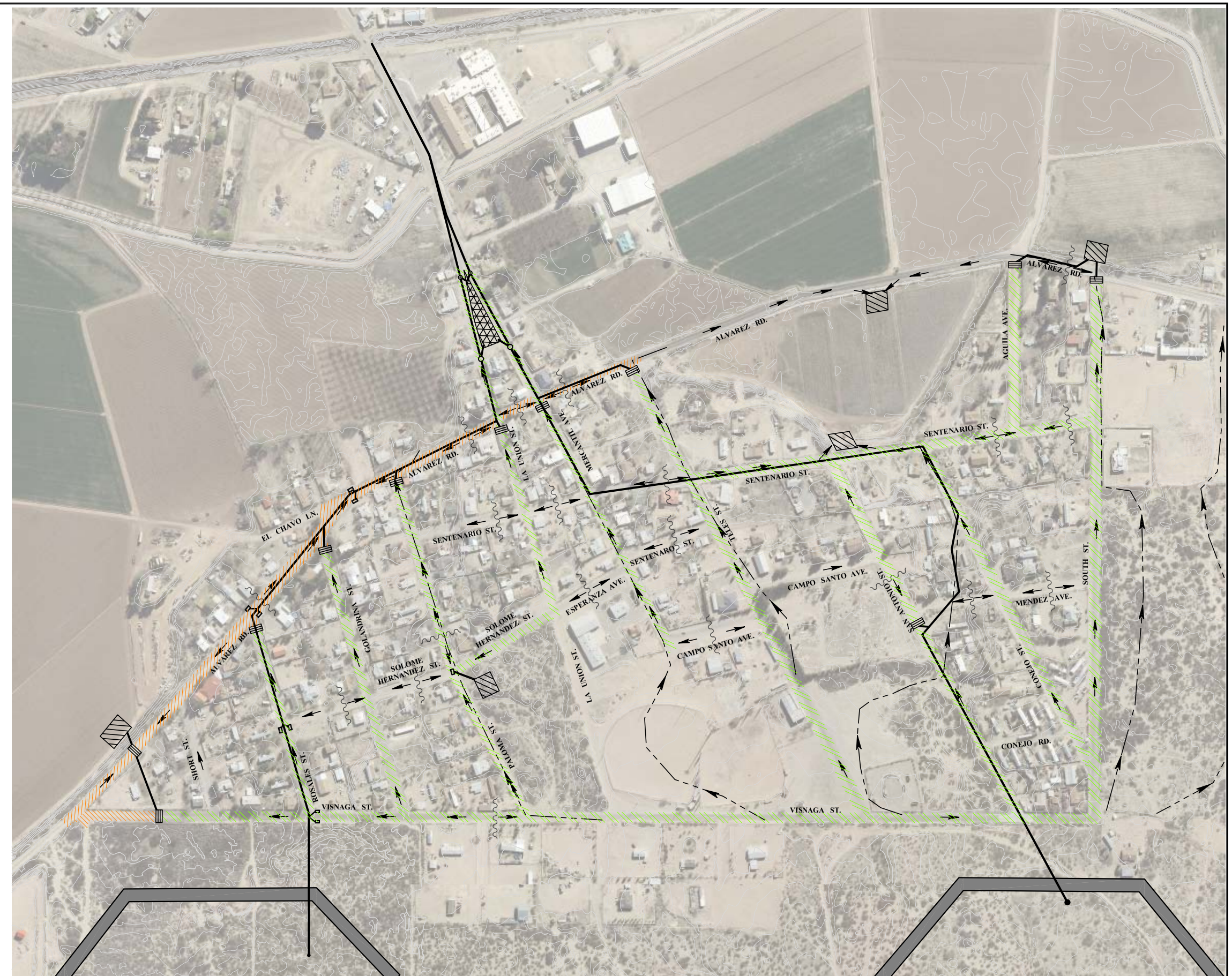
400 0 200 400

SCALE: 1"=400'

GRAPHIC SCALE IN FEET

LARKIN GROUP NM, INC.

CONSULTING ENGINEERS AND SURVEYORS



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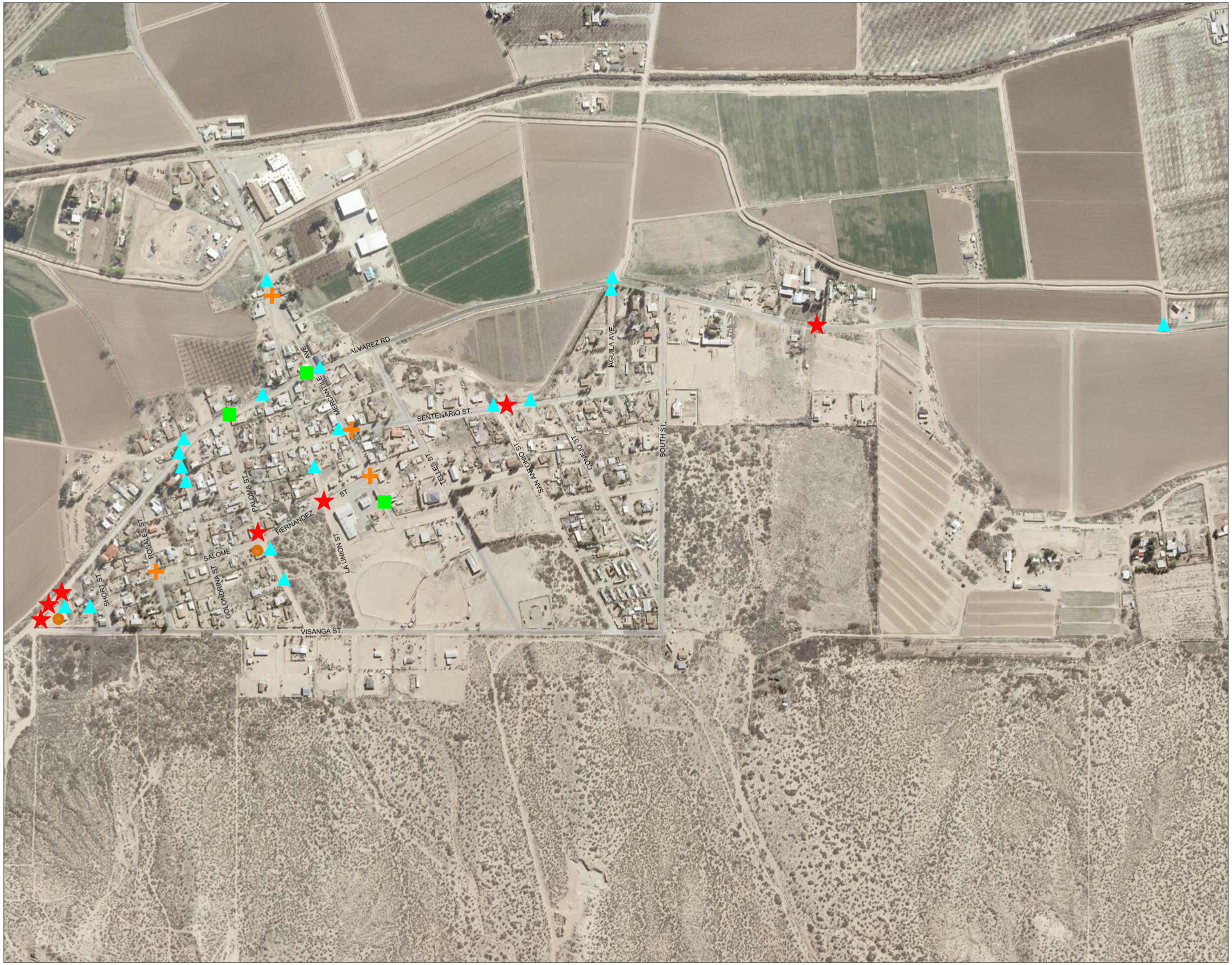
BY	DATE	DESCR.	SCALE	APPROVED	DVO

DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 14 PROPOSED STREET IMPROVEMENTS
TWO DAM OPTION



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CONSULTING ENGINEERS AND SURVEYORS
8500 MENAUL BLVD. NE A-440
ALBUQUERQUE, NEW MEXICO 87112
(505) 275-7500 FAX (505) 275-0748

LEGEND

- FLOODS ROAD
- EROSION
- PONDING
- DEPOSITION
- HIGH FLOWS

600 0 300 600

SCALE: 1"=600'
GRAPHIC SCALE IN FEET

FIGURE 2 - PUBLIC INPUT SUMMARY

DÕNA ANA COUNTY FLOOD COMMISSION
LA UNION DRAINAGE MASTER PLAN

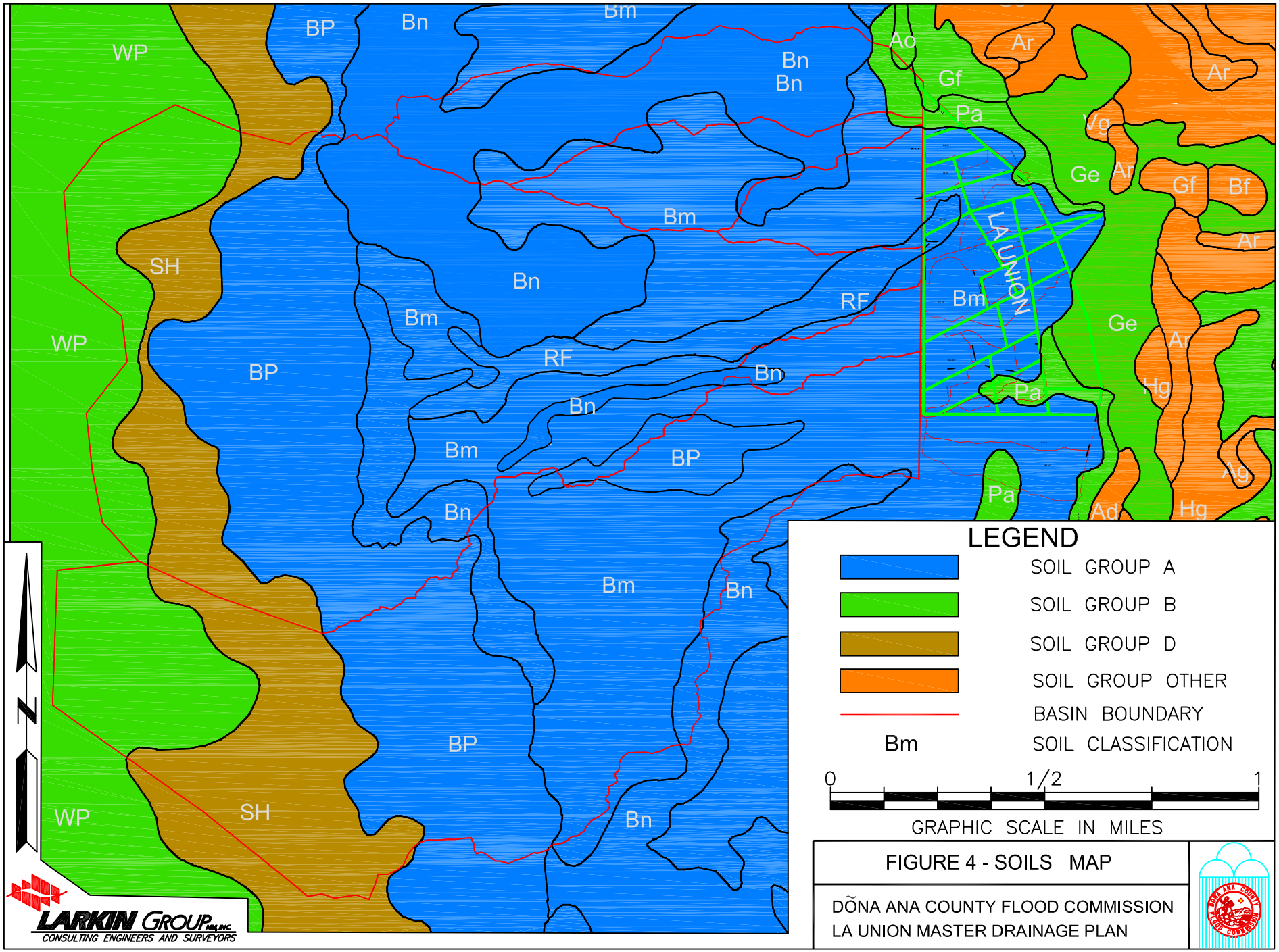
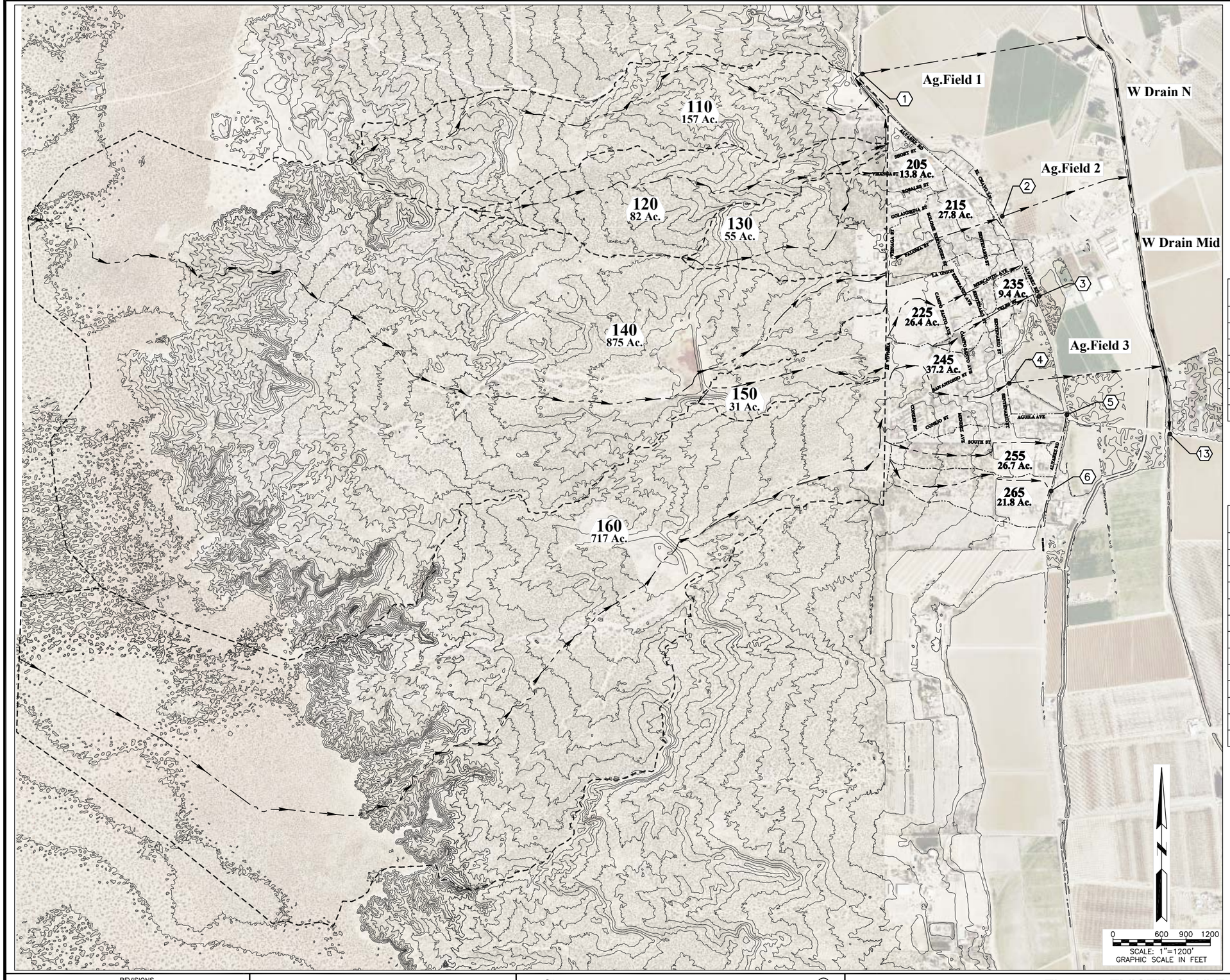


FIGURE 4 - SOILS MAP

DÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN



LEGEND

1X0 OFF-SITE DRAINAGE BASIN LABEL

2X5 ON-SITE DRAINAGE BASIN LABEL

XX Ac. DRAINAGE BASIN AREA (ACRES)

DRAINAGE BASIN BOUNDARY

ANALYSIS POINT (AP)

HISTORICAL FLOWS

FLOW DIRECTION

EXISTING CONTOURS (10 FT. INTERVAL)

AMC III

ANALYSIS POINT	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
AP 1	173.7	351.9	26.9	52.4
AP 2	260.7	520.1	84.0	163.8
AP 3	38.6	72.0	3.8	6.9
AP 4	146.7	287.0	73.9	144.4
AP 5	24.5	47.2	2.7	5.0
AP 6	19.1	37.0	2.2	4.1
AP 13	441.3	867.1	182.3	358.7

AMC II

ANALYSIS POINT	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
AP 1	66.2	145.4	15.7	33.6
AP 2	183.4	363.9	81.4	160.7
AP 3	19.8	38.9	2.6	5.0
AP 4	59.2	130.5	43.2	92.8
AP 5	11.4	23.4	1.7	3.4
AP 6	8.7	18.4	1.4	2.8
AP 13	256.3	516.2	138.4	285.9

AMC III

SUB BASIN	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
110	81.1	164.5	13.5	26.4
120	52.2	105.7	7.0	13.8
130	46.0	92.6	4.7	9.3
140	260.4	518.6	81.1	158.3
150	21.1	42.7	2.7	5.3
160	144.7	285.6	67.0	131.5
205	21.1	38.0	1.6	3.0
215	32.7	60.4	3.0	5.5
225	27.0	50.6	2.8	5.1
235	13.5	24.8	1.0	1.9
245	50.4	91.8	4.3	7.7
255	24.5	47.2	2.7	5.0
265	19.1	37.0	2.2	4.1

AMC II

SUB BASIN	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
110	31.3	69.3	7.8	16.9
120	19.9	44.1	4.0	8.6
130	17.9	39.9	2.7	5.8
140	182.2	362.9	79.3	156.8
150	8.0	17.7	1.5	3.3
160	59.1	127.3	38.8	83.9
205	11.8	22.4	1.2	2.2
215	17.3	33.5	2.1	4.0
225	13.7	27.0	1.9	3.6
235	7.2	13.9	0.7	1.4
245	26.9	52.0	3.0	5.6
255	11.4	23.4	1.7	3.4
265	8.7	18.4	1.4	2.8

LARKIN GROUP, P.A., P.C.
CONSULTING ENGINEERS AND SURVEYORS

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BY ____ DATE ____ DESCR. ____

DATE ____ DRAWN GTM
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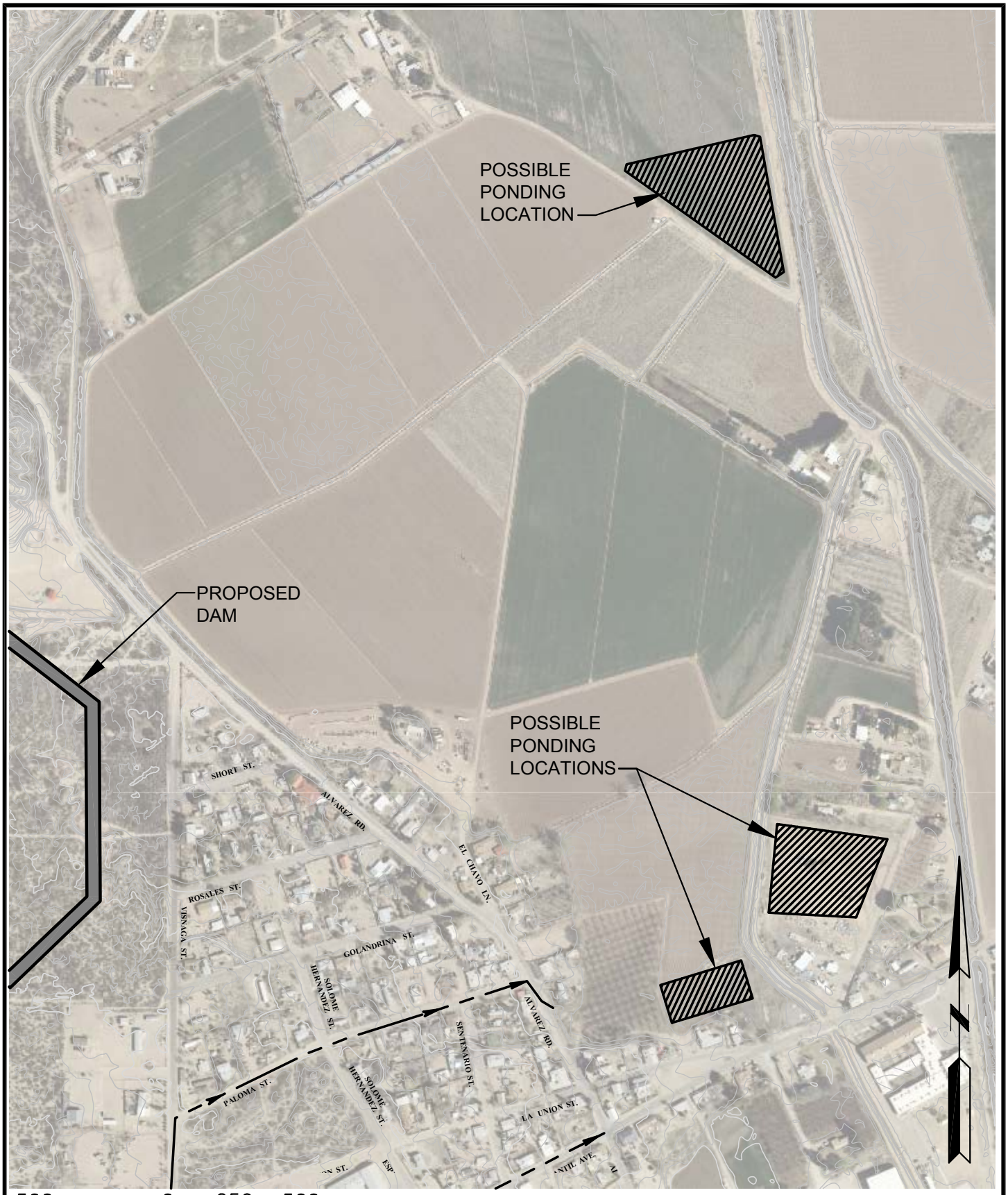
DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 5 EXISTING HYDROLOGY



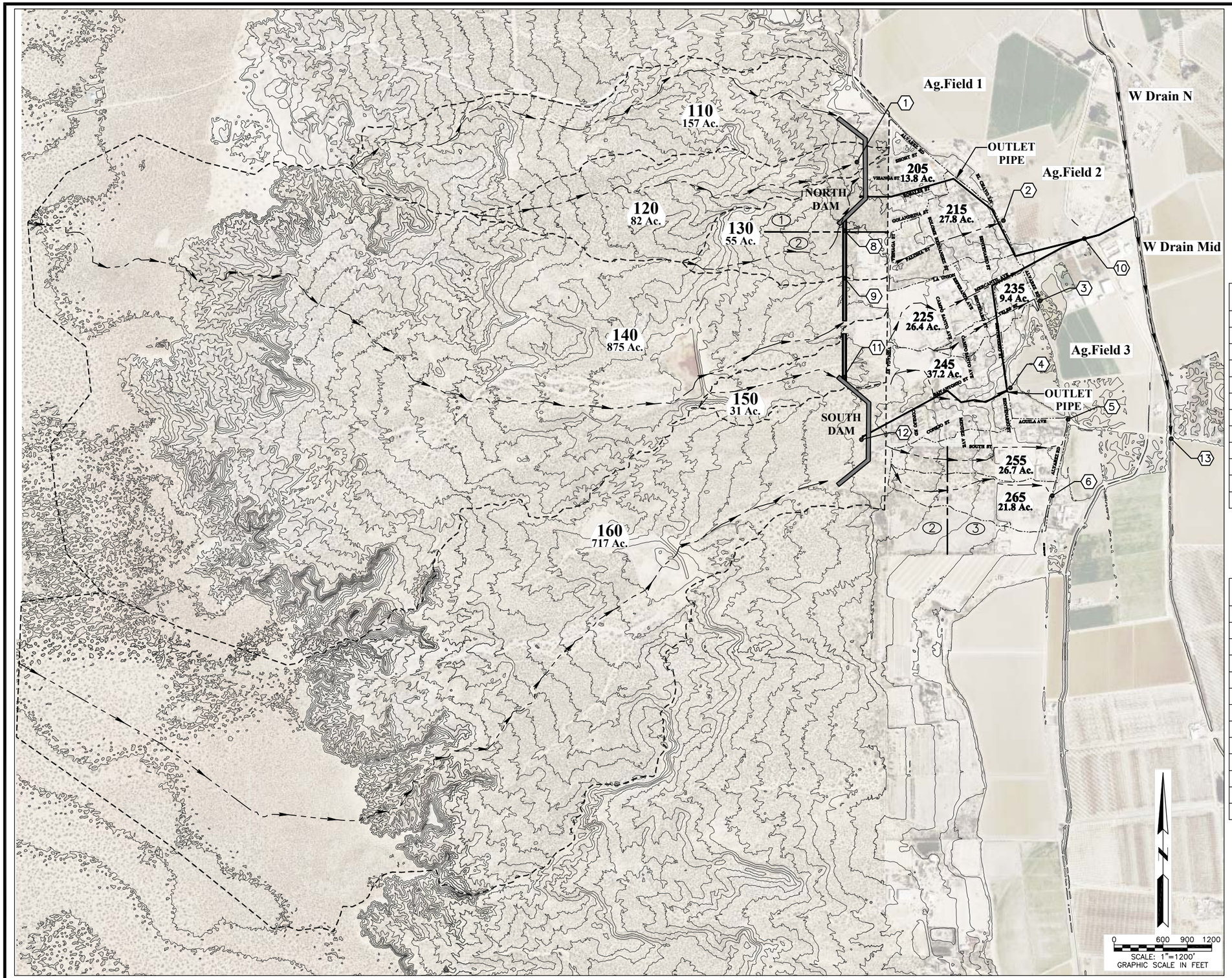
500 0 250 500

SCALE: 1"=500'

Figure 6 POSSIBLE PONDING LOCATIONS

LARKIN GROUP NM, INC.
CONSULTING ENGINEERS AND SURVEYORS

DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN



LEGEND

- **1X0** OFF-SITE DRAINAGE BASIN LABEL
- **2X5** ON-SITE DRAINAGE BASIN LABEL
- **XX Ac.** DRAINAGE BASIN AREA (ACRES)
- DRAINAGE BASIN BOUNDARY
- (X) ANALYSIS POINT (AP)
- HISTORICAL FLOWS
- FLOW DIRECTION
- EXISTING CONTOURS (10 FT. INTERVAL)

AMC III

ANALYSIS POINT	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
AP 1	187.4	269.1	100.5	202.4
AP 2	32.7	60.4	3.0	5.5
AP 3	13.5	24.8	1.0	1.9
AP 4	50.4	91.8	4.3	7.7
AP 5	24.5	47.2	2.7	5.0
AP 6	19.1	37.0	2.2	4.1
AP 8	261.7	522.4	85.7	167.5
AP 9	260.4	518.6	81.1	158.3
AP 10	269.5	422.9	167.3	342.3
AP 11	21.1	42.7	2.7	5.3
AP 12	96.8	157.9	59.6	126.5
AP 13	269.1	421.9	166.3	341.5

AMC III

SUB BASIN	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
110	81.1	164.5	13.5	26.4
120	52.2	105.7	7.0	13.8
130	46.0	92.6	4.7	9.3
140	260.4	518.6	81.1	158.3
150	21.1	42.7	2.7	5.3
160	144.7	285.6	67.0	131.5
205	21.1	38.0	1.6	3.0
215	32.7	60.4	3.0	5.5
225	27.0	50.6	2.8	5.1
235	13.5	24.8	1.0	1.9
245	50.4	91.8	4.3	7.7
255	24.5	47.2	2.7	5.0
265	19.1	37.0	2.2	4.1

PROPERTY OWNERSHIP KEY

1. UNITED STATES OF AMERICA
2. SAM E. CROSSETT
3. CAROL MYRE

LARKIN GROUP, INC.
CONSULTING ENGINEERS AND SURVEYORS

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BY ____ DATE ____ DESCR. ____

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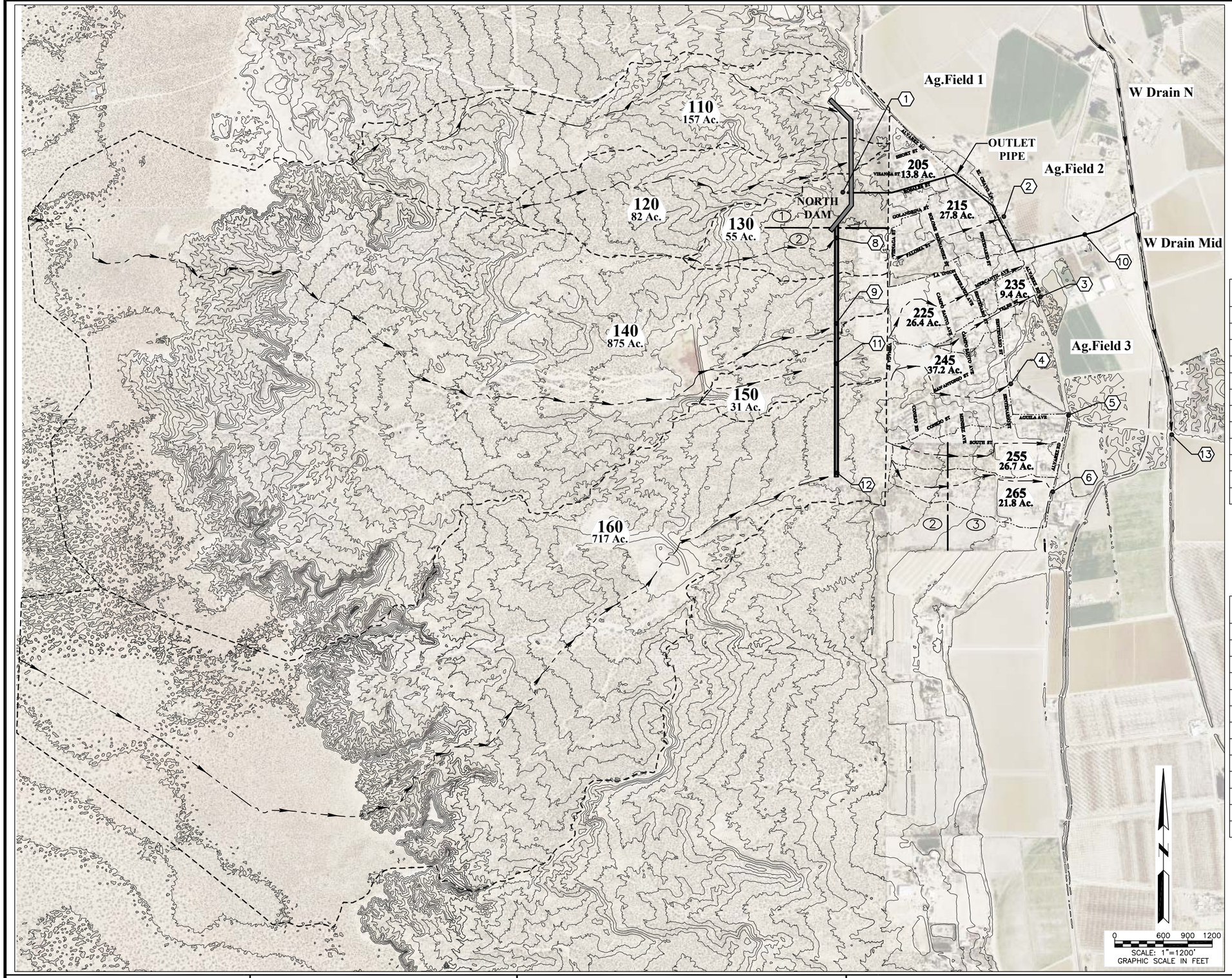
DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 7 PROPOSED HYDROLOGY - OPTION 1



LEGEND

- **1X0** OFF-SITE DRAINAGE BASIN LABEL
- **2X5** ON-SITE DRAINAGE BASIN LABEL
- **XX Ac.** DRAINAGE BASIN AREA (ACRES)
- DRAINAGE BASIN BOUNDARY
- (X) ANALYSIS POINT (AP)
- HISTORICAL FLOWS
- FLOW DIRECTION
- EXISTING CONTOURS (10 FT. INTERVAL)

AMC III

ANALYSIS POINT	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
AP 1	128.5	196.0	138.0	237.9
AP 2	32.7	60.4	3.0	5.5
AP 3	38.6	72.0	3.8	6.9
AP 4	50.4	91.8	4.3	7.7
AP 5	24.5	47.2	2.7	5.0
AP 6	19.1	37.0	2.2	4.1
AP 8	371.0	744.1	155.2	304.1
AP 9	369.2	738.6	150.6	294.9
AP 10	130.1	196.1	142.1	245.1
AP 11	145.8	286.6	69.6	136.7
AP 12	144.7	285.6	67.0	131.5
AP 13	129.7	196.1	140.6	242.4

AMC III

SUB BASIN	10 yr. cfs	100 yr. cfs	10 yr. Volume (AC-FT)	100 yr. Volume (AC-FT)
110	81.1	164.5	13.5	26.4
120	52.2	105.7	7.0	13.8
130	46.0	92.6	4.7	9.3
140	260.4	518.6	81.1	158.3
150	21.1	42.7	2.7	5.3
160	144.7	285.6	67.0	131.5
205	21.1	38.0	1.6	3.0
215	32.7	60.4	3.0	5.5
225	27.0	50.6	2.8	5.1
235	13.5	24.8	1.0	1.9
245	50.4	91.8	4.3	7.7
255	24.5	47.2	2.7	5.0
265	19.1	37.0	2.2	4.1

PROPERTY OWNERSHIP KEY

1. UNITED STATES OF AMERICA
2. SAM E. CROSSETT
3. CAROL MYRE

LARKIN GROUP, P.A., INC.
CONSULTING ENGINEERS AND SURVEYORS

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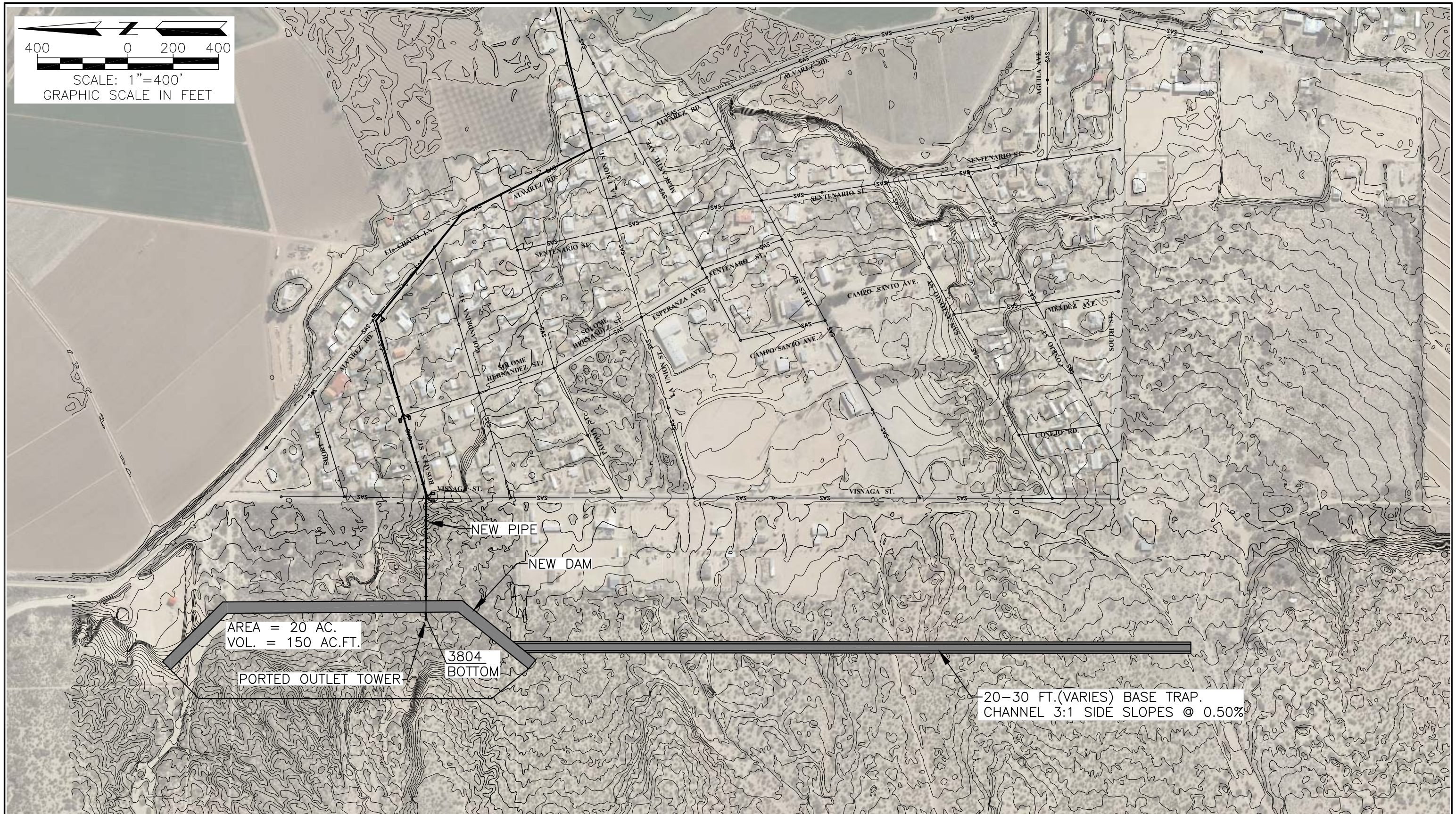
BY_____ DATE_____ DESCR._____
BY_____ DATE_____ DESCR._____

DATE_____ DRAWN GTM
SCALE_____ CHECKED DVO
APPROVED DVO

DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 8 PROPOSED HYDROLOGY - OPTION 2



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BY	DATE	DESCR.		CHECKED DVO
BY	DATE	DESCR.	SCALE	APPROVED DVO

DOÑA ANA COUNTY FLOOD COMMISSION
LA UNION MASTER DRAINAGE PLAN

Figure 9 SINGLE DAM PRELIMINARY CHANNEL & DAM OPTION 2