MASTER DRAINAGE REPORT

1st Submittal: August 28, 2024
2nd Submittal: October 27, 2025

TES Eloy Parcel

City of Eloy, Arizona

Master Drainage Report



Prepared for:
HAJ Management, LLC
8989 E. Via Linda, #117A
Scottsdale, AZ 85258

Prepared by:
Coe & Van Loo Consultants, Inc.
4550 N. 12th Street
Phoenix, AZ 85014
Contact: William Haas, PE, CFM
602.264.6831

CVL Project Number: 1.01.04099.02

CVL CONSULTANTS

MASTER DRAINAGE REPORT

FOR

TES ELOY PARCEL

ELOY, ARIZONA

1st Submittal: August 28, 2024

2nd Submittal: October 27, 2025

Prepared for:

HAJ Management, LLC

8989 E. Via Linda #117A

Scottsdale, AZ 85258

Prepared by:

Coe & Van Loo Consultants, Inc.

4550 N. 12th Street

Phoenix, AZ 85014

Contact: William Haas, PE, CFM

(602) 264-6831



CVL Project Number: 1.01.04099.02

Master Drainage Report for

TES Eloy Parcel

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Scope 1

1.2 Regulatory Jurisdiction 1

2 LOCATION AND EXISTING SITE CONDITIONS 1

3 PROPOSED DEVELOPMENT 2

4 FEMA FLOOD ZONE INFORMATION 2

5 OFF-SITE HYDROLOGY 2

6 ON-SITE DRAINAGE 3

6.1 On-site Hydrology & Hydraulics 3

6.2 Stormwater Retention 3

7 HYDROLOGY 4

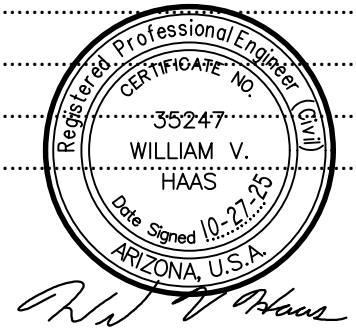
8 HYDRAULICS 5

9 FINISHED FLOOR ELEVATION REQUIREMENTS 6

10 SEDIMENT AND EROSION 6

11 SUMMARY AND CONCLUSIONS 7

12 REFERENCES 8



Tables

Table 7-1: Hydrologic Parameters 5
Table 8-1: Hydraulic Parameters..... 5
Table 8-2: Inlet Parameters..... 6

Exhibits

Exhibit 1 Vicinity & Location Map
Exhibit 2 Conceptual Site Plan
Exhibit 3 FEMA Flood Insurance Rate Map (FIRM)

Appendices

Appendix A Off-site Hydrology Documentation
A.1 Excerpts from Eloy Industrial Park Hydrologic Analysis by Entellus
Appendix B On-site Hydrology and Hydraulics Documentation
B.1 NOAA 14 Rainfall Data
B.2 Soils Documentation
B.3 Stormwater Retention Calculations

1 INTRODUCTION

1.1 SCOPE

Coe & Van Loo Consultants, Inc. (CVL) has been contracted by HAJ Management, LLC to provide engineering services for the proposed TES Eloy Parcel development (the Site). The purpose of this report is to present a preliminary hydrologic analysis for the proposed development and to address off-site drainage, on-site drainage, and stormwater storage requirements.

This report provides practical design information, evaluations, and analyses for statistical flood events up to and including the 100-year frequency event. The scope of this assessment does not include evaluation of stormwater runoff resulting from events exceeding the 100-year storm. Therefore, it should be noted storms greater than the 100-year event may result in greater flood impacts than those addressed in this assessment.

All procedures used in this study are based on currently accepted engineering methodologies and practices. The criteria applied herein conform to the ordinances, regulations, and policies of the City of Eloy and Pinal County currently in effect.

1.2 REGULATORY JURISDICTION

The proposed development has been designed to comply with the drainage requirements of the City of Eloy as defined in the *Eloy Code of Ordinances*, 15-4-15: *Drainage* [1]. In addition, the development will follow the policies and design standards established in the *Pinal County Drainage Manual Volume I: Design Criteria* (PCDM I) [2], *Pinal County Drainage Manual Volume II: Design Methodology and Procedures* (PCDM II) [3], and the *Pinal County Drainage Ordinance No. 100798-DO* [4].

2 LOCATION AND EXISTING SITE CONDITIONS

The TES Eloy Parcel is located at the northwest corner of Eleven Mile Corner Road and Battaglia Road in the City of Eloy, Arizona. More generally, the Site lies within Section 36, Township 7 South, Range 7 East of the Gila and Salt River Base and Meridian, Pinal County, Arizona. The Assessor's Parcel Number (APN) is 404-12-0050.

The Site is irregular in shape and encompasses approximately 338 acres of undeveloped desert land. It is bounded by a water treatment facility and the CAP Santa Rosa Canal to the north, Casa Grande-Picacho

Highway to the south, agricultural land to the east, and undeveloped desert land to the west. Refer to **Exhibit 1** for a vicinity and location map.

The ground surface generally slopes to the northwest. Soils within the Site consist primarily of Contine clay loam, Toltec fine sandy loam, Glenbar clay loam, and Mohall loam. Detailed soils information is provided in **Appendix B.2**.

3 PROPOSED DEVELOPMENT

The proposed TES Eloy Parcel development will include industrial, commercial, and residential land uses, along with drainage and utility infrastructure necessary to support the project. A conceptual site plan is provided in **Exhibit 2**.

The Site is currently zoned **R1-12 (Single-Family Residential)** and is proposed to be rezoned to **MU PAD (Mixed-Use Planned Area Development).**

4 FEMA FLOOD ZONE INFORMATION

According to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, Panel No. 04021C1590F, effective May 16, 2019 [5], the Site is located within Zone X (unshaded).

Per the Federal Emergency Management Agency (FEMA), Zone X (unshaded) represents an "Area of minimal flood hazard."

Refer to **Exhibit 3** for the FIRM excerpt showing the Site and surrounding areas.

5 OFF-SITE HYDROLOGY

Off-site runoff that affects the Site has been previously evaluated in the *Eloy Industrial Park Hydrologic Analysis* prepared by Entellus [6]. That study utilized HEC-1 to model existing hydrologic conditions for the Eloy Industrial Park Area. Relevant excerpts from the analysis are provided in **Appendix A.1**.

According to the Entellus study, off-site flows are conveyed around the TES Eloy Parcel via a channel parallel to Eleven Mile Corner Road and by the Santa Rosa Canal. As a result, the Site is primarily affected by shallow sheet flow rather than concentrated off-site discharge.

6 ON-SITE DRAINAGE

6.1 ON-SITE HYDROLOGY & HYDRAULICS

On-site hydrology will be evaluated once lotting and grading layouts are finalized during preliminary design. Hydrologic analyses will conform to the standards and methodologies outlined in *Pinal County Drainage Manual Volume I: Design Criteria* (PCDM I) and *Volume II: Design Methodology and Procedures* (PCDM II) [2] [3].

The on-site drainage facilities will be designed in accordance with Pinal County requirements. Drainage subbasins will be delineated based on the preliminary design of the overall development.

The conceptual drainage approach is to provide adequate retention for the 100-year 2-hour storm event, as required by Pinal County [2] [3]. During final design, the internal street network will be designed to convey on-site runoff toward retention basins or underground retention facilities. Local streets will be designed such that the 10-year storm event remains within the top of curb, and the 100-years event remains within the public right-of-way.

Where street conveyance capacity is exceeded, scuppers or storm drain systems will intercept and direct excess flow to designated retention basins or underground storage facilities. Riprap erosion protection will be provided at all scupper inlets and storm drain outfalls.

Post-development peak discharge, volume, and velocity will not exceed pre-development conditions, nor will post-development drainage concentrate existing sheet flows without adequate downstream control, in accordance with City of Eloy standards [1]. According to the *Eloy Industrial Park Hydrology Analysis* [6], the pre-development flow from the Site is **737 cfs**.

6.2 STORMWATER RETENTION

Retention will be provided on-site to contain the 100-year, 2-hour storm event, as required by Pinal County [2]. Rainfall data are based on *NOAA Atlas 14* [7], which indicates a 100-year, 2-hour point precipitation depth of **2.37 inches**. Refer to **Appendix B.1** for NOAA Atlas 14 data.

The required retention volumes will be calculated in accordance with Pinal County requirements [2] [3] using the following equation:

$$V_{REQ} = C\left(\frac{P}{12}\right)A$$

Where:

V_{REQ} = Required storage volume (acre-ft)

C = Runoff coefficient

P = Rainfall depth per *NOAA Atlas 14*; 2.37 inches (*see* ***Appendix B.1***)

A = Drainage area (acres)

As required by Pinal County [2], retention receptacles must fully drain within 36 hours following the end of a storm event, through infiltration and/or drywells as necessary. Per City of Eloy requirements [1], only 50 percent of the tested percolation capacity may be used when calculating the required number of drywells.

A soil percolation and drywell flow-rate test will be performed during construction to confirm actual infiltration rates and drainage times. The required number of drywells may be adjusted based on the test results. Retention basin and underground retention system locations and capacities will be finalized during preliminary design. Supporting stormwater retention calculations are included in **Appendix B.3**.

7 HYDROLOGY

The on-site hydrology is based on the Rational Method, in accordance with PCDM I and PCDM II [2] [3]. Drainage subbasins will be delineated upon completion of preliminary grading plans.

Precipitation depths and intensities are based on *NOAA Atlas 14* [7], with a 100-year, 2-hour precipitation depth of 2.37 inches. A minimum time of concentration of 5 minutes has been selected as a conservative design parameter, reflecting the relatively flat topography and limited flow paths across the Site.

Runoff coefficients were selected in accordance with the *Eloy Code of Ordinances* [1] and *Table 2-1* of PCDM II [3]. **Table 7-1** summarizes the key hydrologic parameters used in the on-site analysis. Detailed *NOAA Atlas 14* rainfall data for the proposed development are provided in **Appendix B.1**, and weighted runoff coefficient calculations will be completed during preliminary design.

TABLE 7-1: HYDROLOGIC PARAMETERS

		100-Year Runoff Coefficient		
100-Year, 2-Hour Precipitation Depth (in)	Minimum Time of Concentration (min)	Lots	Pavement and Rooftops	Desert Landscaping
2.37	5	0.95	0.95	0.50

8 HYDRAULICS

The on-site drainage facilities will be designed in accordance with PCDM I and PCDM II [2] [3]. Streets within the Site will be designed to convey stormwater toward surface retention basins and/or underground storage facilities.

The 10-year peak flow will be contained within the curbs or below the top-of-curb elevation, while the 100-year peak flow will remain within the right-of-way, with a maximum ponding depth of six inches above the street centerline. Scuppers and/or catch basins will be used to convey the flow from the street into surface or underground retention systems. Scupper and catch basin sizing will be completed during final design.

Storm drain systems for the Site will be designed for the 10-year storm event in accordance with PCDM II [3]. The hydraulic grade line (HGL) for the 10-year event will be maintained at least six inches below the inlet elevation. The 100-year event will be evaluated to ensure that the HGL does not surcharge at manhole locations and that ponding does not exceed eight inches above inlets.

Table 8-1 summarizes the primary hydraulic design parameters for roadway conveyance and storm drain systems. **Table 8-2** provides the inlet design parameters, including clogging factors and detail references.

TABLE 8-1: HYDRAULIC PARAMETERS

Storm Event	Roadway Conveyance	Inlet Ponding Depth at Gutter	Storm Drain HGL
10-Year	Within the curbs	8 inches	At least 6 inches below the inlet elevation
100-Year	Within the right-of-way, provided that flow depths do not exceed 6 inches above the street centerline	10 inches	Below the inlet, ground, or manhole rim elevation

TABLE 8-2: INLET PARAMETERS

Inlet Clogging Factor	Scupper Detail	Catch Basin Detail
1.25	MAG 206	MAG 542-1, -2

9 FINISHED FLOOR ELEVATION REQUIREMENTS

Finished floor elevations (FFE) will be established a minimum of 1 foot above the 100-year water surface elevation of the stormwater storage facility. FFEs will also be set above the emergency basin outfall elevation to prevent backwater effects or inundation during extreme events.

In accordance with PCDM I [2] and the Pinal County Drainage Ordinance [4], the Site will provide at least one all-weather road access to ensure emergency and maintenance accessibility during storm events.

10 SEDIMENT AND EROSION

To prevent erosion at locations where flows are concentrated for conveyance, riprap protection will be provided along spillways, at scuppers outlets, and at storm drain outfalls. Riprap will consist of loose, angular stone with a median particle size (D_{50}) determined during preliminary design. Downstream of storm drain outlets, riprap aprons will be installed to dissipate energy and reduce erosion potential.

Riprap sizing will follow the design procedures presented in Section 10.2 of the *U.S. Department of Transportation, Hydraulic Design of Energy Dissipators for Culverts and Channels, Hydraulic Engineering Circular No.14, Third Edition* (HEC-14) [8], specifically Equation 10.4 for riprap aprons downstream of culverts or storm drain pipes. Riprap thickness and apron dimensions will conform to *Table 10.1* of HEC-14.

Section 8.4.1.1 of PCDM II [3] references HEC-14 as an acceptable standard for riprap energy-dissipator design. Riprap sizing calculations will be prepared during preliminary design.

11 SUMMARY AND CONCLUSIONS

1. The development will be designed in compliance with the City of Eloy drainage requirements as defined in the *Eloy Code of Ordinances* as well as the Pinal County drainage standards as established in PCDM I, PCDM II, and the Pinal County Drainage Ordinance.
2. The TES Eloy Parcel is located within the City of Eloy at the northwest corner of Eleven Mile Corner Road and Battaglia Road (Parcel No. 404-12-0050). The Site encompasses approximately 338 acres of undeveloped desert land.
3. The proposed development will include industrial, commercial, and residential land uses with associated drainage and utility infrastructure.
4. According to the FIRM Panel No. 04021C1590F, the Site lies within Zone X (unshaded), an area of minimal flood hazard.
5. Off-site flows are conveyed around the Site via existing channelized systems, minimizing potential off-site impacts.
6. On-site hydrology will be based on the Rational Method in accordance with Pinal County standards. On-site stormwater retention will also conform to Pinal County requirements.
7. Street and storm drain design will comply with PCDM I, PCDM II, and the Pinal County Drainage Ordinance, ensuring conveyance and capacity requirements are met.
8. Stormwater retention will be provided for the 100-year, 2-hour storm event, consistent with Pinal County criteria.
9. Finished floor elevations (FFE) will be established at least 1 foot above the 100-year water-surface elevation and above the emergency outfall elevation of adjacent basins.
10. To prevent erosion at concentrated flow locations, riprap protection will be installed along spillways, scupper outlets, and storm drain outfalls.
11. The proposed design will not result in adverse drainage impacts or increased runoff to adjacent, upstream, or downstream properties.

This report presents the preliminary hydrologic and hydraulic analyses for the proposed TES Eloy Parcel development. The design concepts and methodologies described herein are consistent with current City of Eloy and Pinal County drainage standards and will be refined during final engineering to ensure full regulatory compliance.

12 REFERENCES

[1] City of Eloy, *Eloy, AZ Code of Ordinances, 15-4-15: Drainage,* April 8, 2024.

[2] Pinal County, "Drainage Manual Volume I: Design Criteria," Pinal County, Arizona, August 2004.

[3] Pinal County, "Drainage Manual Volume II: Design Methodology and Procedures," Pinal County, Arizona, August 2004.

[4] Pinal County, "Pinal County Drainage Ordinance No. 100798-DO," October 7, 1998.

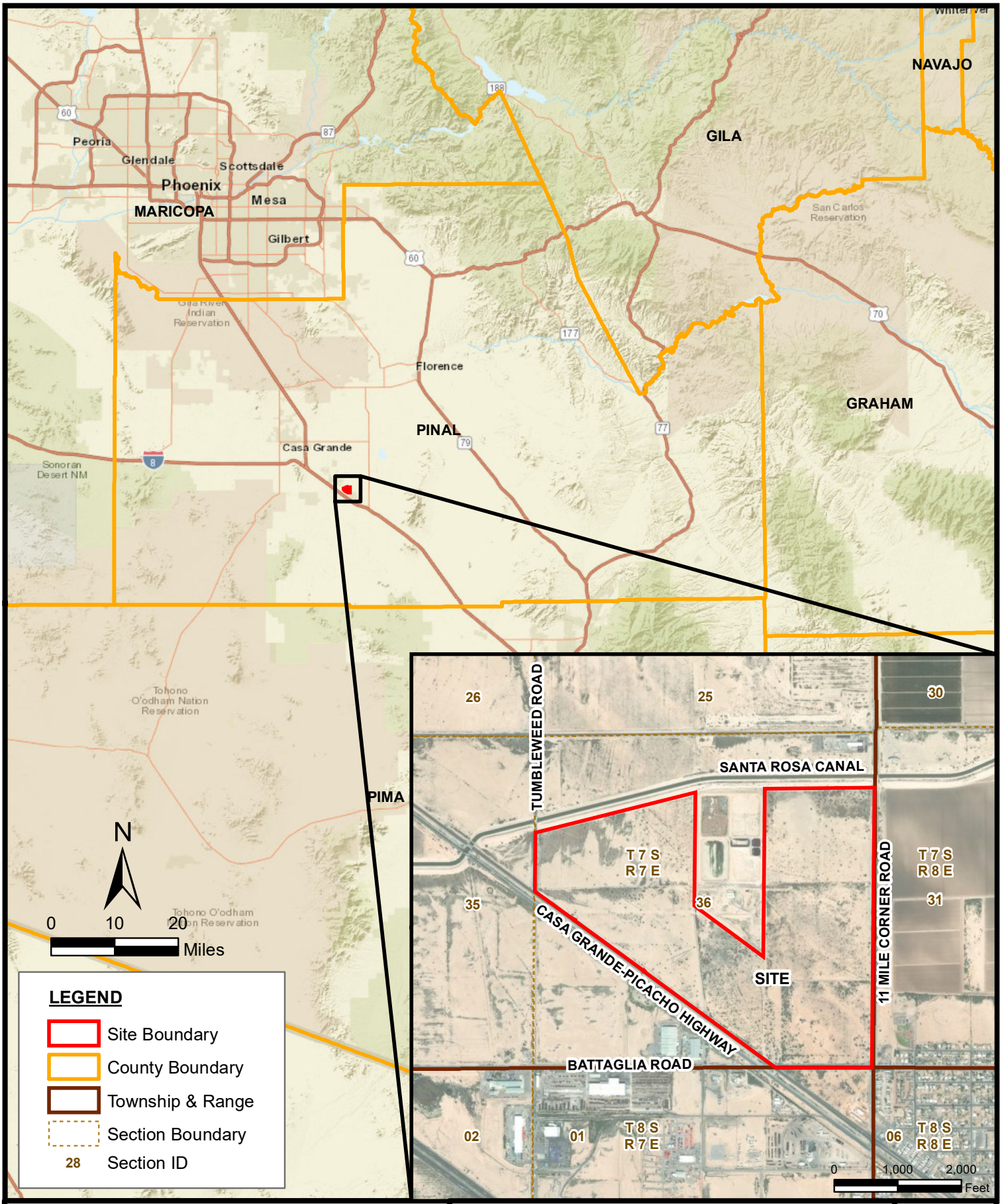
[5] Federal Emergency Management Agency (FEMA), "National Flood Insurance Program, Flood Insurance Rate Map, Maricopa County, Arizona and Incorporated Areas, Panel Number 04021C1590F," Map Revised May 16, 2019.

[6] Entellus, "Eloy Industrial Park Hydrologic Analysis," April 2014.

[7] National Oceanic and Atmospheric Administration, "Precipitation Frequency Data Server (PFDS) NOAA Atlas 14, Volume 1, Version 5," 23 April 2021. [Online]. Available: https://hdsc.nws.noaa.gov/hdsc/pfds/.

[8] U.S. Department of Transportation, "Hydraulic Design of Energy Dissipators for Culverts and Channels, Hydraulic Engineering Circular No. 14, Third Edition," Federal Highway Administration, July 2006.

EXHIBITS



Printed By: sarac Print Date: 8/28/2024 Filename: N:\01\04099\01\Hydro\GIS\Exhibit\Exhibit_1_Vicinity_Location_Map.mxd

CVL CONSULTANTS
4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

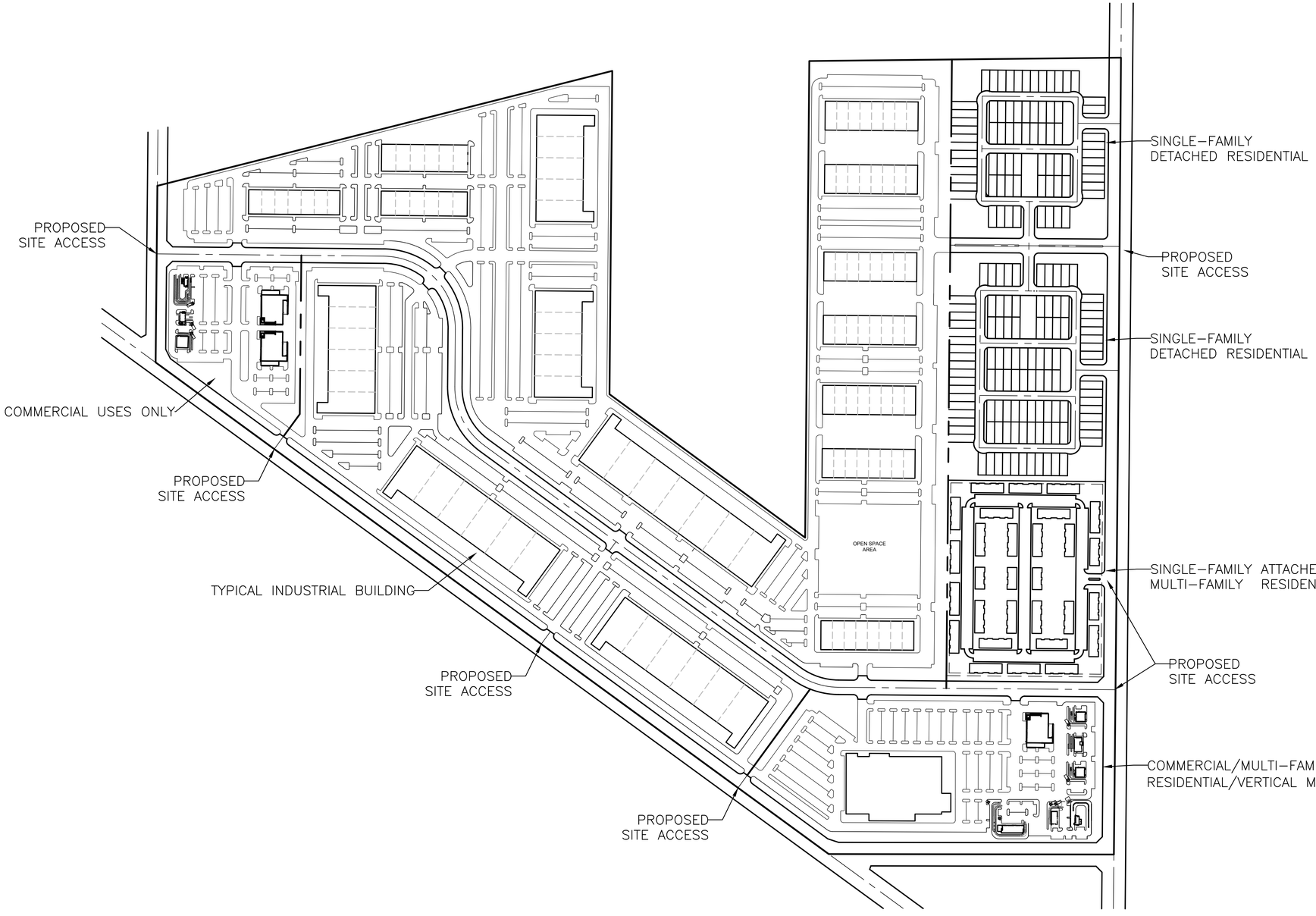
TES ELOY PARCEL

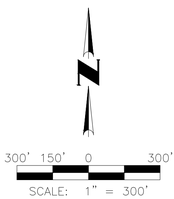
PROJECT #: 01-04099-02

VICINITY & LOCATION MAP

EXHIBIT 1

© 2025 Coe & Van Loo Consultants, Inc. All rights reserved to reproduction in any format





CVL CONSULTANTS
4550 North 12th Street
Phoenix, Arizona 85014
602-264-6831
www.cvlci.com

NO.	REVISION	DATE
1	LAND USES AND OPEN SPACES ADJUSTED PER COMMENTS	10/16/2025

Coe & Van Loo Consultants, Inc.

CONCEPTUAL SITE PLAN

TES ELOY PAD

ELOY, ARIZONA

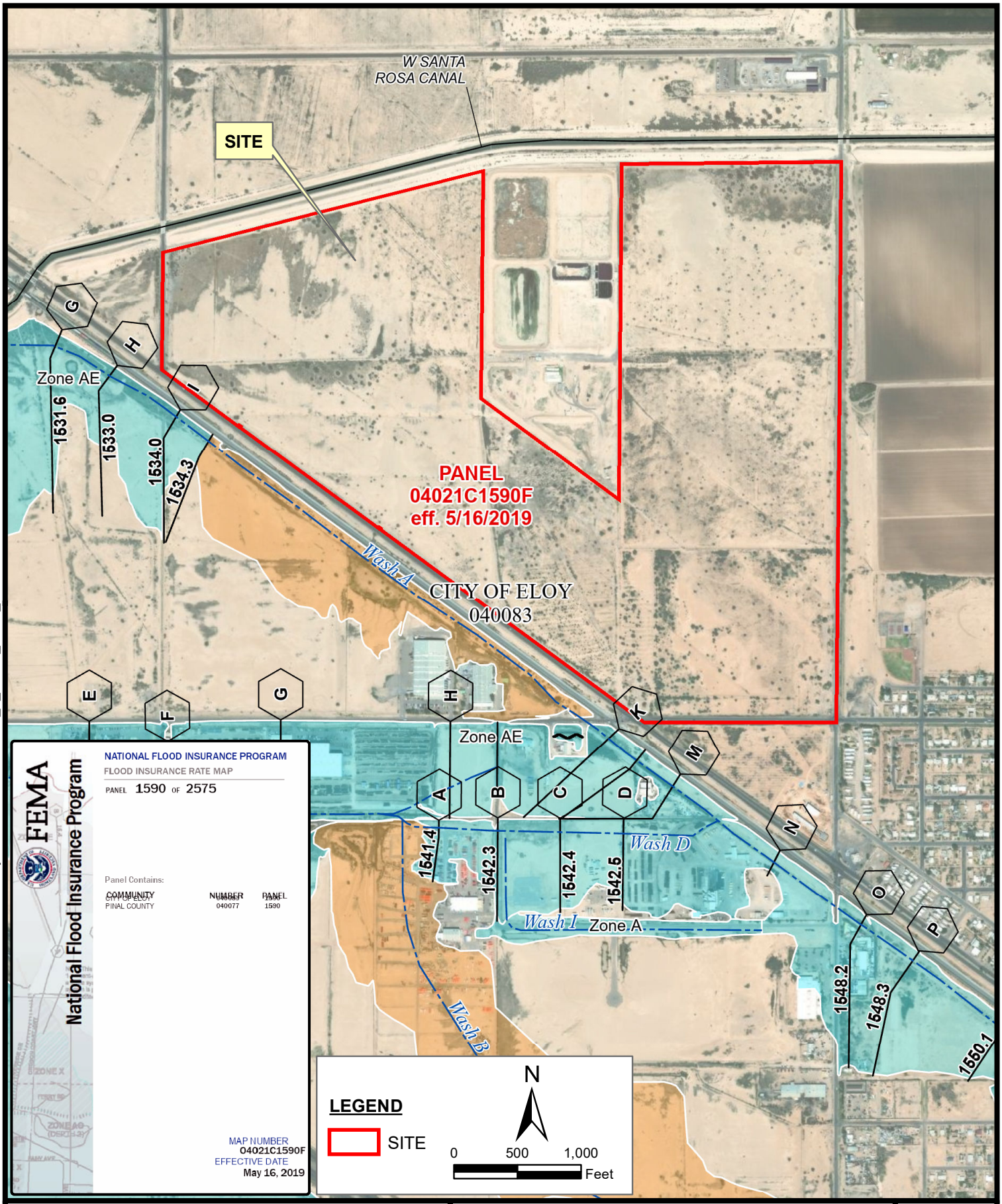
PRELIMINARY

CVL Contact: JULIE VERMILLION
CVL Project #:01-04099-01

CONCEPT
SITE PLAN

EXHIBIT 2

Printed By: **Chrisp** Print Date: **October 16, 2025** Filename: N:\01\04099\01\CADD\Preliminary\PB-SITE.dwg



Printed By: sarac Print Date: 8/28/2024 Filename: N:\01\04099\01\Hydro\GIS\Exhibit\Exhibit_3_FEMA_FIRM_NFHL.mxd

CVL CONSULTANTS
4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

TES ELOY PARCEL

PROJECT #: 01-04099-02

FLOOD INSURANCE RATE MAP

EXHIBIT 3

APPENDICES

CVL

APPENDIX A

Off-site Hydrology Documentation

CVL

A.1

Excerpts from Eloy Industrial Park Hydrologic Analysis by Entellus

CVL

PINAL • COUNTY

Wide open opportunity

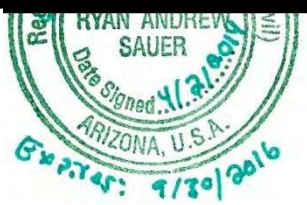
ELOY INDUSTRIAL PARK HYDROLOGIC ANALYSIS

TECHNICAL SUPPORT DATA NOTEBOOK

Contract NO. EV11-004

April 2014

Private Information



Private Information



Prepared by:

Intelligent Engineering
Innovative *Solutions*

Entellus™

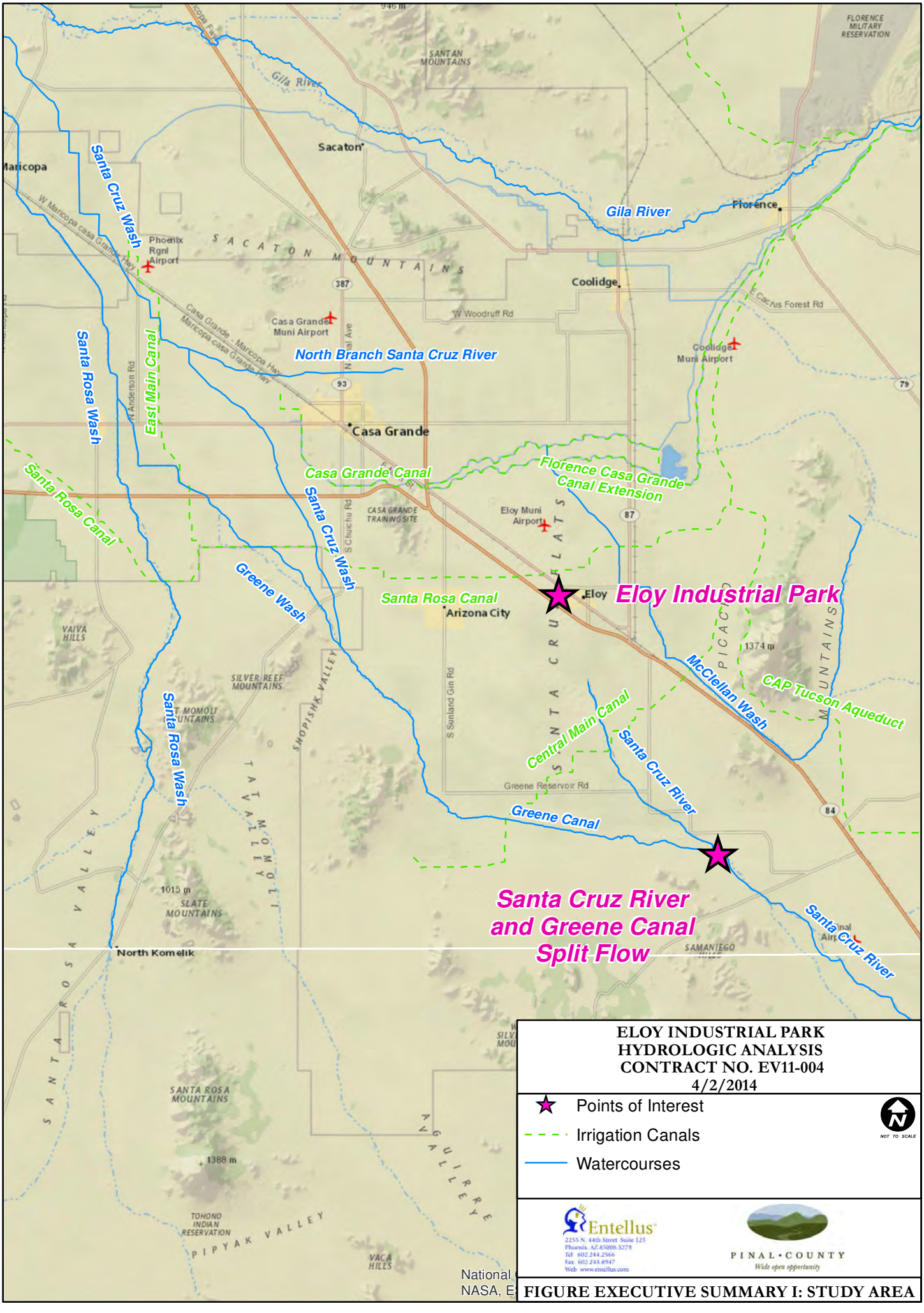
2255 N. 44th Street
Suite 125
Phoenix, AZ 85008
Phone (602) 244 2566
Fax (602) 244 8947
Web: www.entellus.com

EXECUTIVE SUMMARY

This report and associated appendices documents the results of several analyses performed along the Santa Cruz River and downstream contributing areas near Eloy Arizona. The following analyses were performed and are documented here:

- Stream gage analysis along the Santa Cruz River using Bulletin 17b to estimate the 100-year peak discharge entering Pinal County along the Santa Cruz River and an estimation of the 100-year hydrograph for the Santa Cruz River.
- Santa Cruz River and Greene Canal split flow analysis using FLO-2D to estimate the split flow continuing along the Santa Cruz River towards Eloy.
- Hydrologic Analysis using HEC-1 for the existing conditions of the Eloy Industrial Park Area.

The purpose of these analyses was to document the existing conditions in the area of the Santa Cruz River and Greene Canal split and the downstream Eloy Industrial Park area. Significant changes have occurred in the area due to natural events such as subsidence and natural channel degradation. New topographic data was recently obtained by Pinal County (see SECTION 3: Mapping and Survey Information) thus allowing for the analyses to be performed utilizing updated topographic mapping information. None of the analyses performed and documented in this report are the result of newly constructed man-made features (channels, levees, etc). They simply document the existing conditions based on new high resolution topographic data and serve as an update to previous FEMA studies.



ELOY INDUSTRIAL PARK
HYDROLOGIC ANALYSIS
CONTRACT NO. EV11-004
4/2/2014

- Points of Interest
- Irrigation Canals
- Watercourses

NOT TO SCALE

Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Web www.entellus.com

PINAL • COUNTY
Wide open opportunity

National
NASA, E

FIGURE EXECUTIVE SUMMARY I: STUDY AREA

SECTION 1: INTRODUCTION

The information and analyses presented in this report were performed by Entellus, Inc. for Pinal County Public Works as part of the Eloy Industrial Park Hydrologic Analysis under Contract No. EV11-004. This report is structured in Technical Support Data Notebook (TSDN) format in accordance with Arizona State Standard SS1, dated August 2012 (Reference 1).

1.1 Project Purpose

The purpose of this report is to present the findings of the hydrologic analysis and document the methodology, assumptions, problems encountered and solutions as described in the contract Scope of Work.

The primary objective of this study is to establish the existing hydrologic conditions of the Eloy Industrial Park Area. Specifically, this report documents the development of the HEC-1 model utilized to estimate peak discharges resulting from a 100-year storm event at key locations within the study watershed. The hydrologic analysis for the study watershed was performed utilizing the newly acquired 2-foot topographic data (Reference 3). Furthermore, the hydrologic analysis was performed taking into account the recently established split flow relationship between Santa Cruz River and Greene Canal near the Pima/Pinal county boundary. The Santa Cruz River and Greene Canal split flow analysis is documented in the report titled *Santa Cruz River and Greene Canal Split Flow Analysis – Hydrologic and Hydraulics Technical Data Notebook*, December 2013 (Reference 2). This split flow analysis is referred to multiple times in this report and is included in APPENDIX E: Hydraulic Analysis Supporting Documentation for reference.

1.2 Project Location

Eloy Industrial Park is a mile wide stretch of industrial complex between Interstate 10 and the Union Pacific Railroad / State Route 84. It stretches from the I-10 / I-8 interchange on the north to SR-87 on the south (see Figure 1.2 – Vicinity Map). The contributing drainage area to the Eloy Industrial Park, which includes the study area, consists of a 221 square-mile watershed (see Figure 1.1 – Location Map) located in the southwest Pinal County and encompasses City of Eloy and the northeast portion of the unincorporated community of Arizona City. The study area is shown with the Townships and Ranges in Figure 1.3 – Township and Range Map.

The study watershed is part of the Lower Santa Cruz River (LSCR) Watershed. The LSCR is characterized by what is often referred to as the Santa Cruz Flats due to the lack of relief in the topography. Most of the surface runoff in the watershed originates from the Tortolita and Picacho Peak Mountains in the southeast and the Casa Grande Mountains in the north. In addition, the Santa Cruz River enters the study area from the south and makes up almost the entire western border of the watershed. Runoff from the Tortolita Mountains in the southeast flows westerly through the area between the mountains and I-10 and is characterized by desert rangeland with sporadic stock ponds. Several cross drainage structures convey runoff west

across the CAP Tucson Aqueduct, Union Pacific Railroad and I-10. West of I-10, the surface runoff changes direction and flows generally northwesterly towards Eloy Industrial Park. The majority of this portion of the watershed currently consists of surface irrigated agricultural fields and the infrastructure associated with irrigation practices includes berms and canals that, for the most part, impede runoff conveyance. The historical drainage system through the agricultural areas has been either significantly altered or in some areas completely eliminated. Low flows usually run along irrigation canals and agricultural berms, however for large storm events these structures are likely to be overtopped. Other features found in the watershed include the Santa Rosa Canal and Florence-Casa Grande Canal.

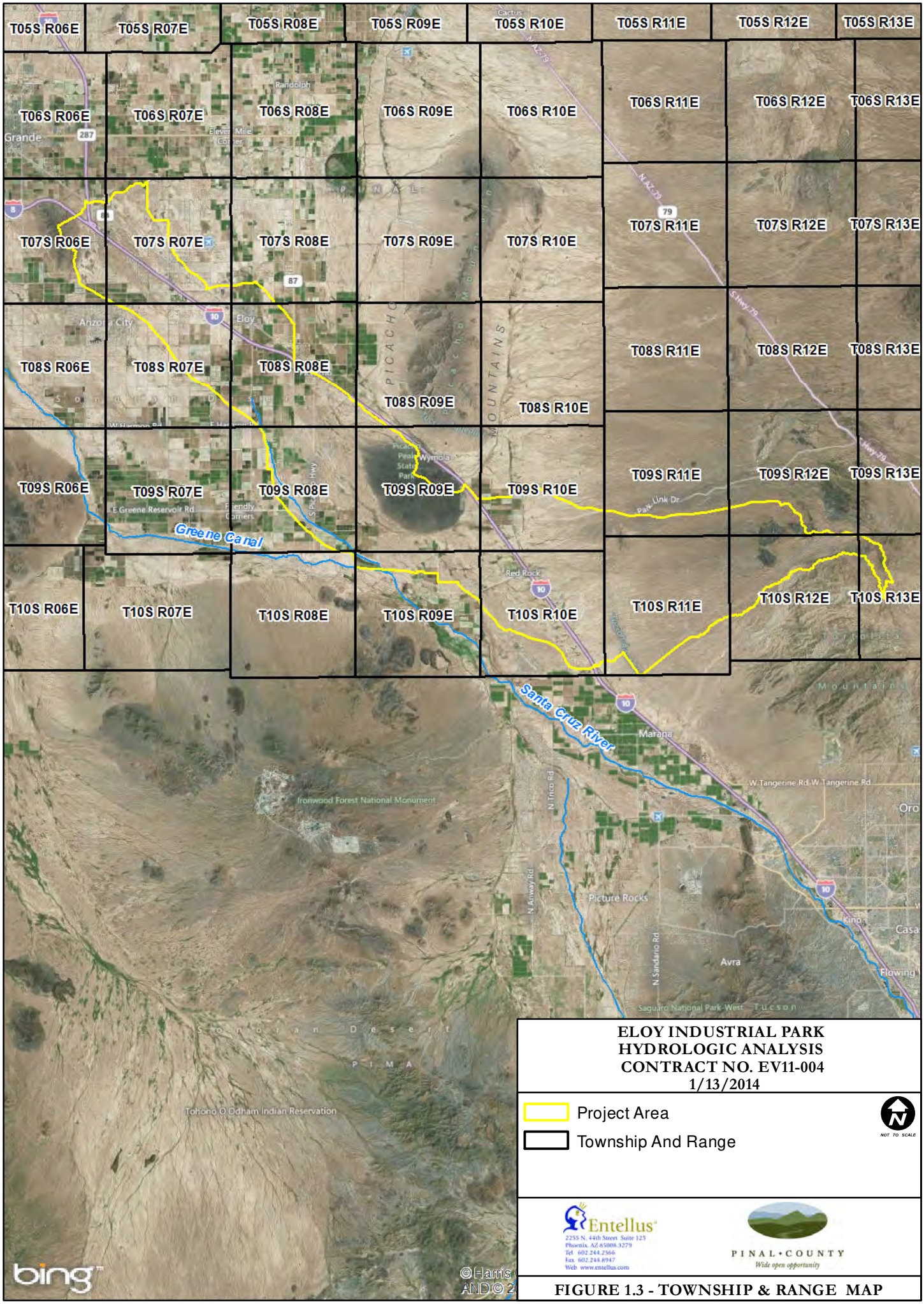
As mentioned previously, the Santa Cruz River enters the study watershed from the south near the Pinal / Pima Boundary. This is immediately downstream of the split flow between the Santa Cruz River and the Greene Canal. This split flow, which has a significant impact on flows throughout the watershed, was previously study for the Pinal County Public Works under the *Santa Cruz River and Greene Canal Split Flow Analysis – Hydrologic and Hydraulics Technical Data Notebook* (Reference 2) dated December 2013. The results of the above mentioned study are included in Section 4.2.6.1: Santa Cruz River Input Hydrograph.

1.3 Hydrologic Methodology and Results

The hydrologic analysis was performed using the U.S. Army Corps of Engineers' (USACE) HEC-1 computer program, version 4.1, dated June 1998 (Reference 4). The HEC-1 parameters were estimated utilizing the Drainage Design Management System for Windows (DDMSW) computer program version 4.6.4, dated September 2013 (Reference 5). The details of the hydrologic modeling, methodology and results are included in SECTION 4: Hydrology and APPENDIX D: Hydrologic Analysis Supporting Documentation.

1.4 Hydraulic Methodology and Results

The hydraulic analysis was not part of this report; however, the *Santa Cruz River and Greene Canal Split Flow Analysis – Hydrologic and Hydraulics Technical Data Notebook* (Reference 2) is included in APPENDIX E: Hydraulic Analysis Supporting Documentation for reference.



ELOY INDUSTRIAL PARK
HYDROLOGIC ANALYSIS
CONTRACT NO. EV11-004
1/13/2014

Project Area

Township And Range

NOT TO SCALE

Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Web www.entellus.com

PINAL • COUNTY
Wide open opportunity

FIGURE 1.3 - TOWNSHIP & RANGE MAP

ELOY INDUSTRIAL PARK
HYDROLOGIC ANALYSIS
CONTRACT NO. EV11-004

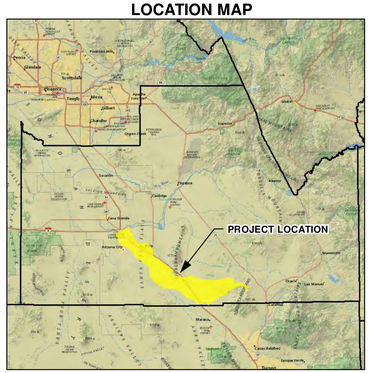
LEGEND

- Concentration Point
- Hydrologic Route
- Subbasin
- Storage Area

TES Eloy Parcel

NOTES:

LOCATION MAP



NORTH

0 1.5 3 Miles

ENTELLUS JOB No. 860029A Date: 4/3/2014

Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Web www.entellus.com

PINAL • COUNTY
Wide open opportunity

PLATE - 1
HYDROLOGY OVERVIEW MAP

Document Path: P:\860\860029A_Eloy_Industrial_Park\D_Production\GIS\mxd\TDN Report Maps\PLATE 1 Hydrology Overview Map.mxd

ELOY INDUSTRIAL PARK
HYDROLOGIC ANALYSIS
CONTRACT NO. EV11-004

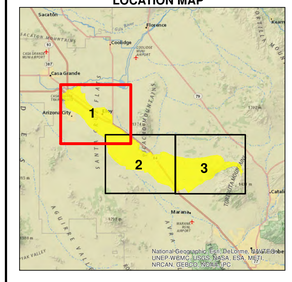
TES Eloy Parcel

LEGEND

- Schematic Line
- Subbasin
- Concentration Points
- Diversions
- Storage
- Routes
- Subbasins
- Santa Cruz River Inflow

NOTES:

LOCATION MAP



NORTH

0 2,000 4,000 Feet

ENTELLUS JOB No. 860029A Date: 2/28/2014

Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Web www.entellus.com

PINAL • COUNTY
Wide open opportunity

PLATE 2
HEC-1 SCHEMATIC
SHEET 1 OF 3

Image courtesy of USGS © AND

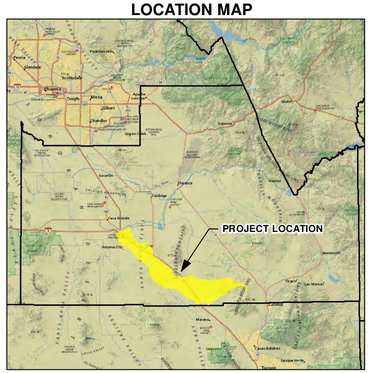
ELOY INDUSTRIAL PARK
HYDROLOGIC ANALYSIS
CONTRACT NO. EV11-004

LEGEND

- Concentration Point 100yr
- Hydrologic Route 100yr
- Subbasin 100yr

NOTES:

LOCATION MAP



NORTH

0 1,000 2,000 Feet

ENTELLUS JOB No. 860029A Date: 4/3/2014

Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Web www.entellus.com

PINAL • COUNTY
Wide open opportunity

PLATE - 5
HYDROLOGY RESULTS MAP
SHEET 1 OF 2

Image courtesy of USGS © 2014 Microsoft Corporation

Document Path: P:\60\860029A_Eloy_Industrial_Park\D_Production\GIS\mxd\TDN Report Maps\PLATE 5 Hydro Results Sht 1.mxd Date: 4/3/2014

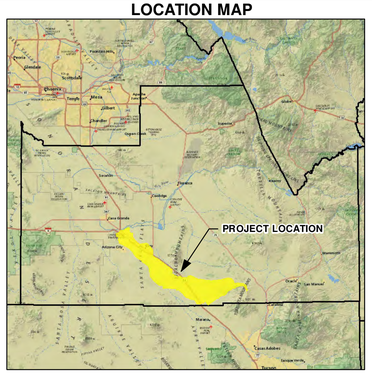
ELOY INDUSTRIAL PARK
HYDROLOGIC ANALYSIS
CONTRACT NO. EV11-004

LEGEND

- Concentration Point 100yr
- Hydrologic Route 100yr
- Subbasin 100yr

NOTES:

LOCATION MAP



NORTH

0 1,000 2,000 Feet

ENTELLUS JOB No. 860029A Date: 4/3/2014

Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
Fax 602.244.8947
Web www.entellus.com

PINAL • COUNTY
Wide open opportunity

PLATE - 5
HYDROLOGY RESULTS MAP
SHEET 2 OF 2

Channelized flow in Santa Rosa Canal

TES Eloy Parcel

Channelized flow east of 11 Mile Corner

HOUSER RD
TUMBLEWEED RD
FRONTIER ST
BATTAGLIA DR
ELOY ST
ALSDORF RD
MILLIGAN RD
PHILLIPS RD
ESTRELLA RD
TWEEDY RD
ELEVEN MILE CORNER
SUNSHINE BLVD
LA PALMA RD
HIGHWAY 84

CEI72 1259 cfs
CEI73 1975 cfs
CEI74 1601 cfs
CEI21 1845 cfs
CEI21A 1850 cfs
CEI20 321 cfs
CEI73A 793 cfs
CEI66 291 cfs
CEI64 675 cfs
CEI63 629 cfs
CEI71 199 cfs
CEI62 1006 cfs
CEI08 436 cfs
CEI07 868 cfs
CEI06 517 cfs
CEI05 534 cfs
CEI04 639 cfs
CEI03 1201 cfs
CEI61 1004 cfs
CEI60 836 cfs
CEI02 1969 cfs
CEI10 776 cfs
CEI01 2783 cfs
CSC46 4606 cfs
CSC45 4611 cfs
CSC44 7200 cfs
CSC37 5542 cfs
CSC36 5557 cfs
CSC35 5564 cfs
RSC47A 5411 cfs
RSC60A 5518 cfs
CSC60A 5530 cfs

BEI80 587 cfs
BEI30 694 cfs
BEI22 864 cfs
BSC61 289 cfs
BEI74 737 cfs
BEI73 459 cfs
BEI72 270 cfs
BEI21 787 cfs
BEI20 318 cfs
BEI08 431 cfs
BEI07 747 cfs
BEI06 357 cfs
BEI66 140 cfs
BEI65 228 cfs
BEI64 611 cfs
BEI63 131 cfs
BEI04 73 cfs
BEI62 834 cfs
BEI71 198 cfs
BSC37 844 cfs
BSC36 297 cfs
BEI05 444 cfs
BEI03 463 cfs
BEI61 166 cfs
BEI70 239 cfs
BSC60 2671 cfs
BEI10 772 cfs
BSC47 333 cfs
BEI02 825 cfs
BEI60 512 cfs
BSC35 466 cfs
BSC48 499 cfs
BEI01 162 cfs
BSC46 497 cfs
BSC50 827 cfs
BSC45 740 cfs
BSC44 1706 cfs

REI74N 2211 cfs
REI74W 1819 cfs
REI73 1598 cfs
REI72 862 cfs
REI73A 790 cfs
REI72N 630 cfs
REI21W 1927 cfs
REI21A 1845 cfs
REI74W 1349 cfs
REI20 184 cfs
REI07N 67 cfs
REI07 502 cfs
REI08 0 cfs
REI06 54 cfs
REI66 184 cfs
REI65N 158 cfs
REI64N 465 cfs
REI62 528 cfs
REI1 0 cfs
REI62N 625 cfs
REI07W 31 cfs
REI06W 461 cfs
REI05W 515 cfs
REI66W 156 cfs
REI64W 275 cfs
REI62W 48 cfs
REI05N 117 cfs
REI04N 105 cfs
REI03N 523 cfs
REI04W 534 cfs
REI03W 517 cfs
REI61 1004 cfs
REI10N 158 cfs
REI10W 222 cfs
REI60W 205 cfs
REI02N 758 cfs
REI02W 1164 cfs
REI01W 1907 cfs
REI01N 832 cfs
REI60N 629 cfs
REI70 90 cfs
RSC36 5542 cfs
RSC35 5557 cfs
RSC47A 95 cfs
RSC46W 4486 cfs
RSC46N 122 cfs
RSC45 4600 cfs
RSC48A 1228 cfs
RSC44N 2694 cfs
RSC44W 4389 cfs
RSC33 3088 cfs
RSC43 1514 cfs
RSC34N 48 cfs
RSC34NN 388 cfs
RSC34S 425 cfs

Date: 4/3/2014

Image courtesy of USGS © 2014 Microsoft Corporation

Document Path: P:\860\860029A_Eloy_Industrial_Park\D_Production\GIS\mxd\TON Report Maps\PLATE 5 Hydro Results Sht 2.mxd Date: 4/3/2014

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' NAVD 88. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table shown in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 12. The **horizontal datum** was NAD 83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1992 or later.

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

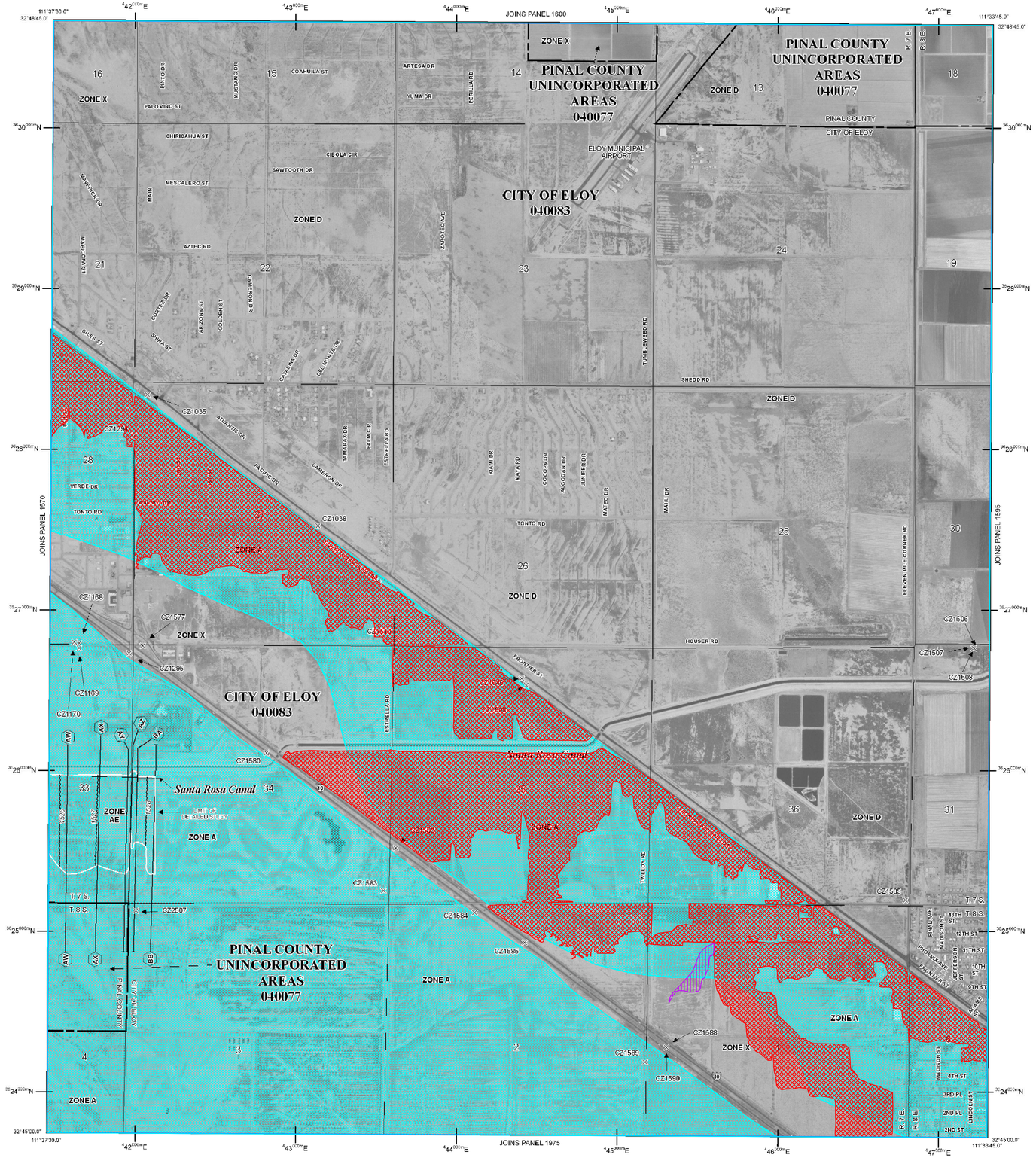
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, an accompanying Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

Zone A
Zone AE
Zone AH



LEGEND

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

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

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
97° 07' 30", 32° 22' 30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000 M	1000-meter Universal Transverse Mercator grid values, zone 12
600000 FT	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
DX5510 x	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 4, 2007
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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

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

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
PANEL 1590E

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
PINAL COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1590 OF 2575

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PINAL COUNTY, UNINCORPORATED AREAS	040077	1590	E
ELOY, CITY OF	040083	1590	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04021C1590E

EFFECTIVE DATE
DECEMBER 4, 2007

Federal Emergency Management Agency

HEC-1 MODEL RESULTS IN MODEL ORDER									
100-Year, 24-Hour									
	Scenario 1			Scenario 2			Scenario 3		
HEC-1 ID	Drainage Area [sq. miles]	Peak Flow [cfs]	Time of Peak [hr]	Drainage Area [sq. miles]	Peak Flow [cfs]	Time of Peak [hr]	Drainage Area [sq. miles]	Peak Flow [cfs]	Time of Peak [hr]
REI73A	47.56	790	26.42	52.51	788	28.25	22.48	775	27.17
DEI03W	70.71	578	24.17	64.64	390	25.75	20.79	157	24.50
REI03W	70.71	577	24.33	64.64	390	25.92	20.79	156	24.67
BEI04	0.04	73	12.17	0.04	73	12.17	0.04	73	12.17
CEI04	34.08	639	24.42	24.96	506	25.67	4.22	260	24.67
DEI04W	34.08	534	24.42	24.96	401	25.67	4.22	155	24.67
DEI04N	34.08	105	22.42	24.96	105	22.75	4.22	105	24.17
REI04N	34.08	105	24.33	24.96	105	24.83	4.22	105	25.08
DEI64W	40.01	210	12.00	43.43	210	12.00	18.46	210	12.00
REI64W	40.01	210	12.50	43.43	210	12.50	18.46	210	12.50
BEI65	0.11	228	12.17	0.11	228	12.17	0.11	228	12.17
CEI65	18.16	426	12.17	18.8	426	12.17	7.57	436	12.17
DEI65W	18.16	156	11.92	18.8	156	11.92	7.57	156	11.92
DEI65N	18.16	270	12.17	18.8	269	12.17	7.57	280	12.17
REI65N	18.16	158	28.75	18.8	158	29.67	7.57	135	28.25
BSC34	0.46	281	13.00	0.46	281	13.00	0.46	281	13.00
DSC34W	0.46	36	13.00	0.46	36	13.00	0.46	36	13.00
DSC34N	0.46	245	13.00	0.46	245	13.00	0.46	245	13.00
RSC34N	0.46	48	23.08	0.46	48	23.08	0.46	48	23.08
DSC44W	447.29	4,504	21.83	445.63	3,800	24.75	156.68	2,831	22.25
RSC44W	447.29	4,389	23.25	445.63	3,769	25.83	156.68	2,784	23.92
BSC45	1.87	740	13.83	1.87	740	13.83	1.87	740	13.83
CSC45	282.1	4,611	23.08	273.17	3,935	25.58	91.69	3,036	23.83
RSC45	282.1	4,603	23.50	273.17	3,933	26.00	91.69	3,032	24.33
BSC46	1.22	497	13.83	1.22	497	13.83	1.22	497	13.83
CSC46	283.32	4,606	23.50	274.39	3,934	26.00	92.91	3,032	24.33
DSC46W	283.32	4,459	23.50	274.39	3,787	26.00	92.91	2,883	24.33
DSC46N	283.32	147	18.33	274.39	147	22.17	92.91	147	22.83
RSC46N	283.32	147	20.92	274.39	147	24.50	92.91	147	25.25
BEI10	0.54	772	12.42	0.54	772	12.42	0.54	772	12.42
CEI10	9.58	776	12.50	10.8	773	12.50	5.05	779	12.50
DEI10W	9.58	271	12.00	10.8	271	12.08	5.05	271	12.00
DEI10N	9.58	506	12.50	10.8	503	12.50	5.05	508	12.50
REI10N	9.58	158	13.42	10.8	156	13.42	5.05	159	13.42
DEI04W	34.08	534	24.42	24.96	401	25.67	4.22	155	24.67
REI04W	34.08	533	24.58	24.96	399	25.83	4.22	152	24.92
BEI05	0.33	444	12.42	0.33	444	12.42	0.33	444	12.42
CEI05	35.04	534	24.50	27.14	414	12.42	6.13	438	12.42
DEI05W	35.04	515	24.50	27.14	396	12.42	6.13	421	12.42
DEI05N	35.04	17	11.67	27.14	17	11.67	6.13	17	11.58
REI05N	35.04	17	14.33	27.14	17	13.50	6.13	17	13.42
DEI65W	18.16	156	11.92	18.8	156	11.92	7.57	156	11.92
REI65W	18.16	156	12.67	18.8	156	12.67	7.57	156	12.67
BEI66	0.07	140	12.17	0.07	140	12.17	0.07	140	12.17
CEI66	7.84	291	12.17	8.09	291	12.17	3.02	292	12.17
REI66	7.84	184	13.25	8.09	184	13.25	3.02	184	13.25
BEI73	0.96	459	13.25	0.96	459	13.25	0.96	459	13.25
CEI73	152.26	1,975	28.25	168.46	1,973	29.42	73.19	1,678	27.83
DEI73N	152.26	370	12.83	168.46	370	12.83	73.19	370	12.83
DEI73	152.26	1,605	28.25	168.46	1,603	29.42	73.19	1,308	27.83
REI73	152.26	1,598	30.00	168.46	1,597	31.17	73.19	1,275	30.00
BEI74	0.67	737	12.58	0.67	737	12.58	0.67	737	12.58
CEI74	99.19	1,601	29.92	109.48	1,601	31.17	45.69	1,345	29.83

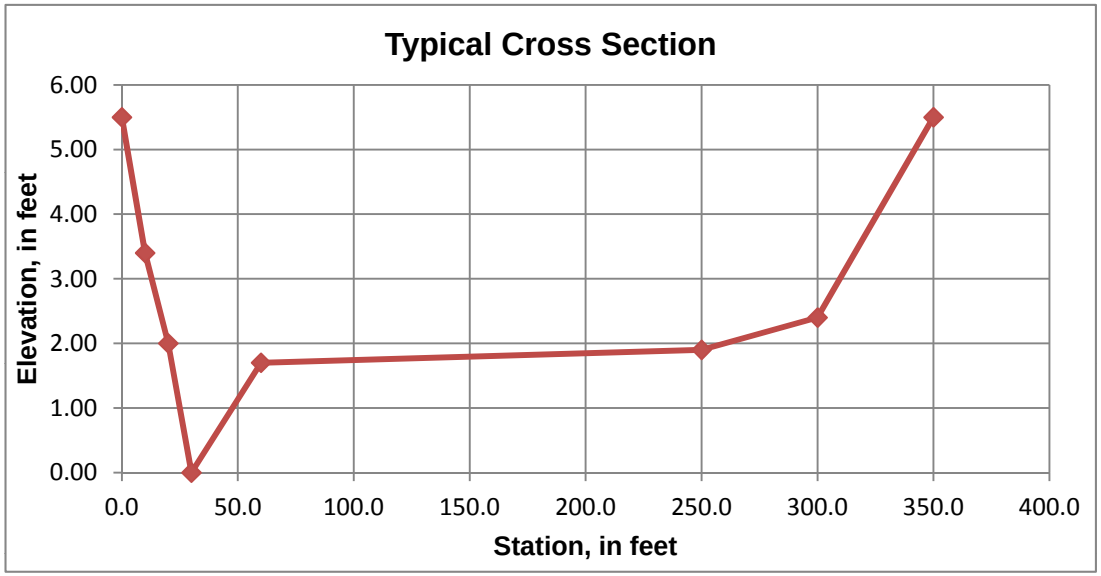
SHEET	117	OF	163
BY	AL	DATE	11/12/2012
CHECK	RAS	DATE	11/12/2012

JOB: Eloy Industrial Park Analysis
ENTELLUS NO. 860.029A
ANALYSIS: Hydrologic Routing Data

ROUTE ID: REI66

ROUTE CONDITIONS		LOB		CHANNEL		ROB	
Channel Bed Material	n_0	Firm Soil	0.029	Firm Soil	0.029	Firm Soil	0.029
Degree of Irregularity	n_1	Minor	0.003	Minor	0.003	Minor	0.003
Effects of Obstructions	n_2	Minor	0.010	Minor	0.010	Minor	0.010
Vegetation	n_3	Negligible	0.001	Negligible	0.001	Small	0.006
Variations in Channel Cross Section	n_4	Gradual	0.000	Gradual	0.000	Gradual	0.000
Degree of Meandering	m	Minor	1.000	Minor	1.000	Minor	1.000
$n = (n_0 + n_1 + n_2 + n_3 + n_4)m$	**n**	**Composite**	**0.045**	**Composite**	**0.045**	**Composite**	**0.050**

DESCRIPTION: Shallow Channel Parallel to RD



Typical Cross Section	
Station [ft]	**Elevation [ft]**
0.0	5.50
10.0	3.40
20.0	2.00
30.0	0.00
60.0	1.70
250.0	1.90
300.0	2.40
350.0	5.50

Length [ft]	4427
Slope [ft/ft]	0.0020

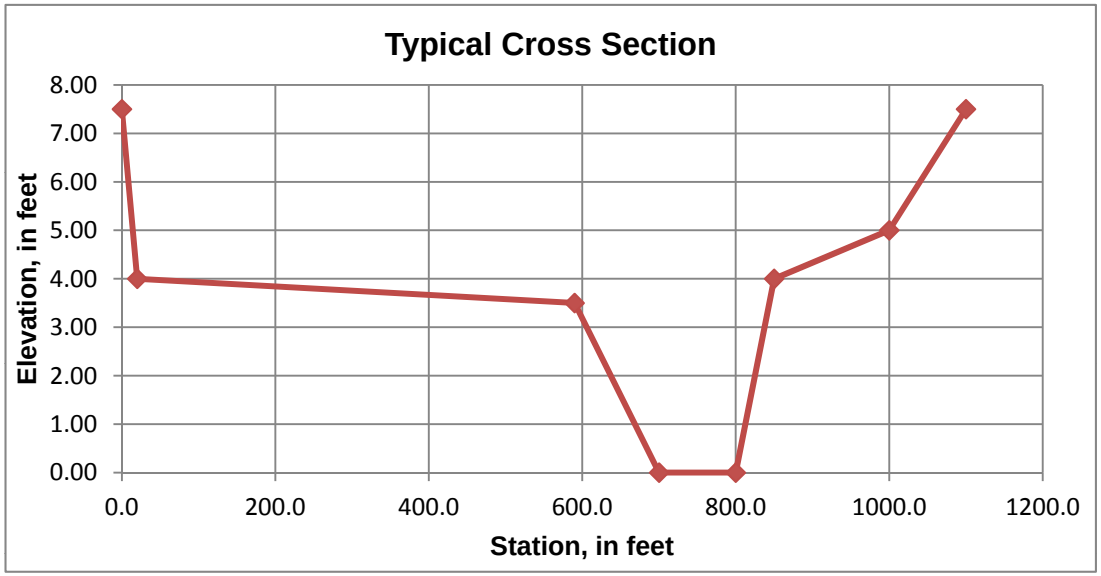
SHEET	26	OF	163
BY	AL	DATE	11/12/2012
CHECK	RAS	DATE	11/12/2012

JOB: Eloy Industrial Park Analysis
ENTELLUS NO. 860.029A
ANALYSIS: Hydrologic Routing Data

ROUTE ID: REI73

ROUTE CONDITIONS		LOB		CHANNEL		ROB	
Channel Bed Material	n_0	Firm Soil	0.029	Firm Soil	0.029	Firm Soil	0.029
Degree of Irregularity	n_1	Minor	0.003	Minor	0.003	Minor	0.003
Effects of Obstructions	n_2	Minor	0.010	Minor	0.010	Minor	0.010
Vegetation	n_3	Medium	0.018	Negligible	0.001	Negligible	0.001
Variations in Channel Cross Section	n_4	Gradual	0.000	Gradual	0.000	Gradual	0.000
Degree of Meandering	m	Minor	1.000	Minor	1.000	Minor	1.000
$n = (n_0 + n_1 + n_2 + n_3 + n_4)m$	**n**	**Composite**	**0.060**	**Composite**	**0.045**	**Composite**	**0.045**

DESCRIPTION: Canal Frontage Road Channel



Typical Cross Section	
Station [ft]	**Elevation [ft]**
0.0	7.50
20.0	4.00
590.0	3.50
700.0	0.00
800.0	0.00
850.0	4.00
1000.0	5.00
1100.0	7.50

Length [ft]	6391
Slope [ft/ft]	0.0002

APPENDIX B

On-site Hydrology and Hydraulics Documentation

CVL

B.1

NOAA 14 Rainfall Data

CVL

NOAA Atlas 14, Volume 1, Version 5
Location name: Eloy, Arizona, USA*
Latitude: 32.7686°, Longitude: -111.5744°
Elevation: 1538 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.206 (0.176-0.246)	0.268 (0.231-0.321)	0.363 (0.309-0.432)	0.434 (0.368-0.515)	0.531 (0.444-0.627)	0.606 (0.499-0.713)	0.682 (0.552-0.802)	0.759 (0.604-0.893)	0.861 (0.668-1.02)	0.940 (0.714-1.12)
10-min	0.313 (0.268-0.374)	0.408 (0.351-0.489)	0.552 (0.470-0.658)	0.661 (0.560-0.784)	0.809 (0.676-0.955)	0.922 (0.759-1.08)	1.04 (0.840-1.22)	1.16 (0.920-1.36)	1.31 (1.02-1.55)	1.43 (1.09-1.70)
15-min	0.388 (0.332-0.464)	0.506 (0.435-0.606)	0.685 (0.583-0.816)	0.819 (0.694-0.972)	1.00 (0.838-1.18)	1.14 (0.942-1.34)	1.29 (1.04-1.51)	1.43 (1.14-1.68)	1.62 (1.26-1.92)	1.77 (1.35-2.10)
30-min	0.523 (0.448-0.625)	0.682 (0.586-0.817)	0.922 (0.785-1.10)	1.10 (0.935-1.31)	1.35 (1.13-1.59)	1.54 (1.27-1.81)	1.73 (1.40-2.04)	1.93 (1.54-2.27)	2.19 (1.70-2.58)	2.39 (1.82-2.83)
60-min	0.647 (0.554-0.773)	0.844 (0.725-1.01)	1.14 (0.971-1.36)	1.37 (1.16-1.62)	1.67 (1.40-1.97)	1.91 (1.57-2.24)	2.14 (1.74-2.52)	2.39 (1.90-2.81)	2.71 (2.10-3.20)	2.96 (2.25-3.51)
2-hr	0.744 (0.641-0.875)	0.962 (0.830-1.14)	1.28 (1.10-1.51)	1.52 (1.30-1.79)	1.85 (1.56-2.16)	2.11 (1.74-2.46)	2.37 (1.94-2.76)	2.64 (2.11-3.08)	3.00 (2.34-3.51)	3.28 (2.50-3.86)
3-hr	0.804 (0.695-0.949)	1.03 (0.891-1.22)	1.35 (1.16-1.59)	1.60 (1.36-1.88)	1.95 (1.64-2.28)	2.23 (1.85-2.60)	2.52 (2.05-2.94)	2.83 (2.26-3.30)	3.25 (2.52-3.80)	3.59 (2.72-4.22)
6-hr	0.970 (0.853-1.12)	1.22 (1.08-1.41)	1.56 (1.37-1.80)	1.83 (1.60-2.11)	2.21 (1.90-2.52)	2.50 (2.12-2.85)	2.80 (2.33-3.20)	3.12 (2.55-3.56)	3.55 (2.82-4.06)	3.88 (3.02-4.46)
12-hr	1.11 (0.986-1.26)	1.40 (1.24-1.58)	1.76 (1.57-2.00)	2.06 (1.81-2.32)	2.45 (2.14-2.75)	2.76 (2.38-3.09)	3.07 (2.60-3.45)	3.39 (2.83-3.82)	3.82 (3.12-4.33)	4.15 (3.32-4.74)
24-hr	1.25 (1.14-1.38)	1.59 (1.45-1.75)	2.06 (1.88-2.27)	2.43 (2.21-2.67)	2.95 (2.66-3.23)	3.36 (3.01-3.67)	3.78 (3.37-4.14)	4.22 (3.73-4.62)	4.83 (4.22-5.29)	5.31 (4.59-5.82)
2-day	1.37 (1.24-1.51)	1.75 (1.58-1.93)	2.30 (2.07-2.54)	2.74 (2.46-3.02)	3.35 (2.99-3.69)	3.84 (3.41-4.23)	4.35 (3.84-4.80)	4.89 (4.29-5.41)	5.64 (4.89-6.26)	6.25 (5.36-6.96)
3-day	1.45 (1.31-1.61)	1.85 (1.68-2.06)	2.44 (2.20-2.71)	2.91 (2.62-3.22)	3.57 (3.19-3.96)	4.11 (3.65-4.54)	4.67 (4.12-5.17)	5.27 (4.61-5.84)	6.11 (5.28-6.78)	6.79 (5.81-7.56)
4-day	1.53 (1.38-1.71)	1.95 (1.77-2.18)	2.58 (2.33-2.88)	3.09 (2.77-3.43)	3.80 (3.40-4.22)	4.38 (3.89-4.85)	5.00 (4.40-5.54)	5.65 (4.94-6.27)	6.58 (5.67-7.31)	7.33 (6.26-8.16)
7-day	1.70 (1.54-1.90)	2.17 (1.96-2.42)	2.86 (2.58-3.19)	3.43 (3.08-3.82)	4.22 (3.76-4.69)	4.86 (4.31-5.39)	5.55 (4.88-6.14)	6.27 (5.47-6.95)	7.29 (6.28-8.10)	8.12 (6.92-9.03)
10-day	1.90 (1.71-2.12)	2.43 (2.20-2.72)	3.22 (2.89-3.59)	3.84 (3.44-4.29)	4.72 (4.21-5.25)	5.43 (4.81-6.04)	6.18 (5.44-6.87)	6.97 (6.08-7.75)	8.08 (6.96-9.00)	8.97 (7.66-10.0)
20-day	2.35 (2.11-2.62)	3.03 (2.72-3.37)	4.00 (3.59-4.44)	4.74 (4.24-5.25)	5.73 (5.11-6.34)	6.49 (5.76-7.18)	7.28 (6.42-8.05)	8.06 (7.09-8.93)	9.13 (7.95-10.1)	9.95 (8.60-11.1)
30-day	2.78 (2.52-3.05)	3.57 (3.25-3.93)	4.71 (4.28-5.18)	5.58 (5.06-6.13)	6.75 (6.09-7.40)	7.65 (6.87-8.38)	8.57 (7.65-9.39)	9.50 (8.44-10.4)	10.8 (9.46-11.8)	11.7 (10.2-13.0)
45-day	3.24 (2.94-3.57)	4.18 (3.78-4.61)	5.51 (4.99-6.07)	6.50 (5.87-7.15)	7.80 (7.02-8.56)	8.79 (7.87-9.64)	9.78 (8.72-10.7)	10.8 (9.56-11.9)	12.1 (10.7-13.3)	13.1 (11.5-14.5)
60-day	3.59 (3.24-3.95)	4.63 (4.20-5.10)	6.10 (5.52-6.72)	7.16 (6.47-7.89)	8.55 (7.70-9.41)	9.58 (8.59-10.5)	10.6 (9.47-11.7)	11.6 (10.3-12.8)	12.9 (11.4-14.3)	13.9 (12.2-15.4)

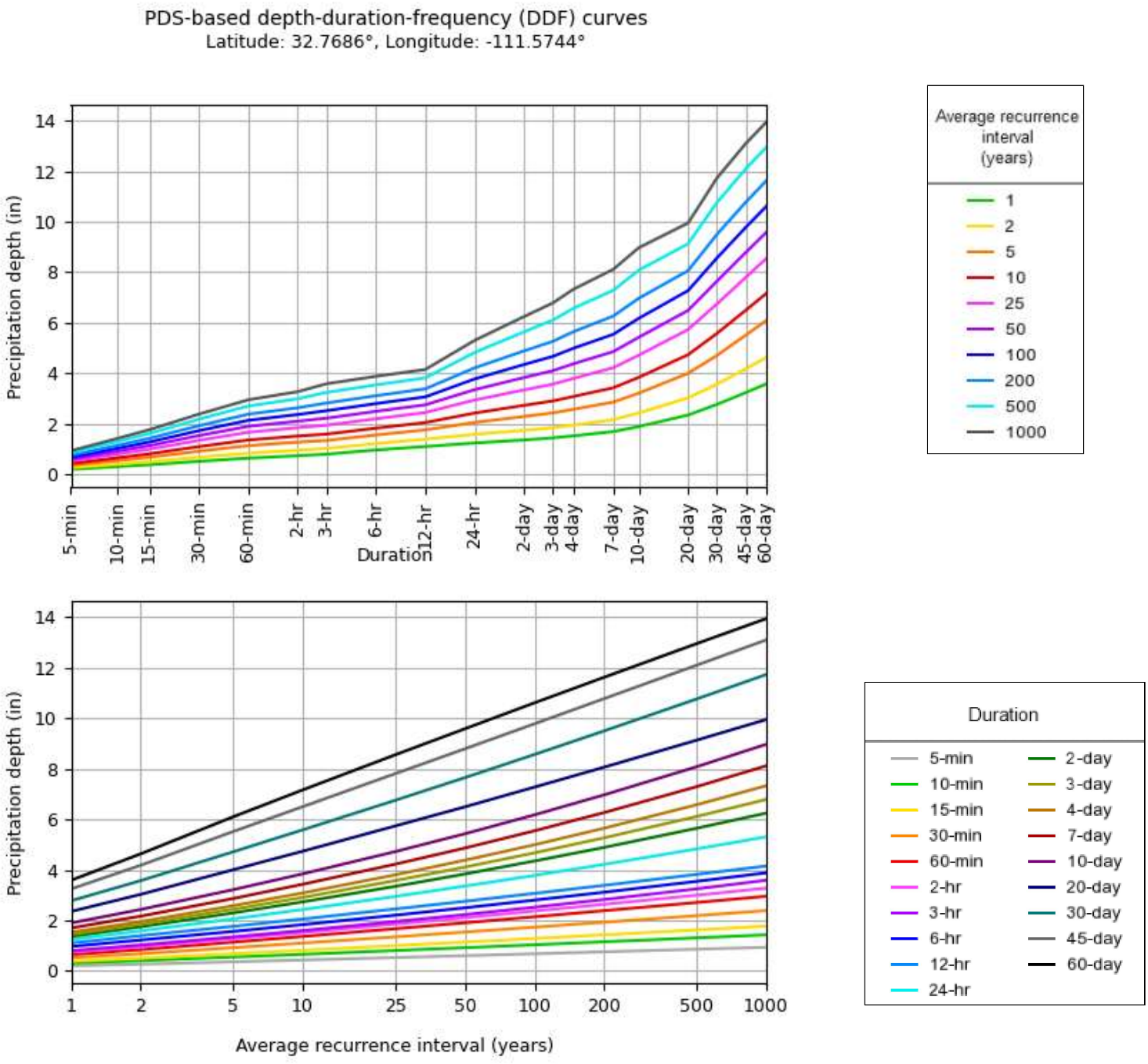
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



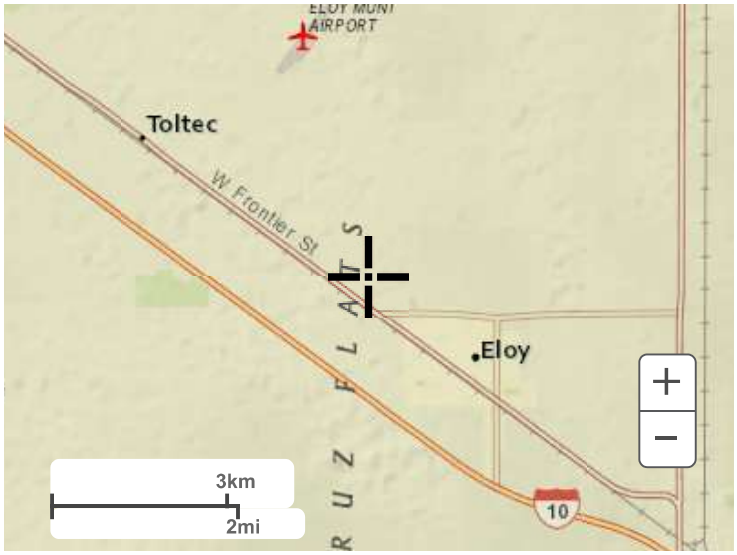
NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Wed Aug 7 23:27:16 2024

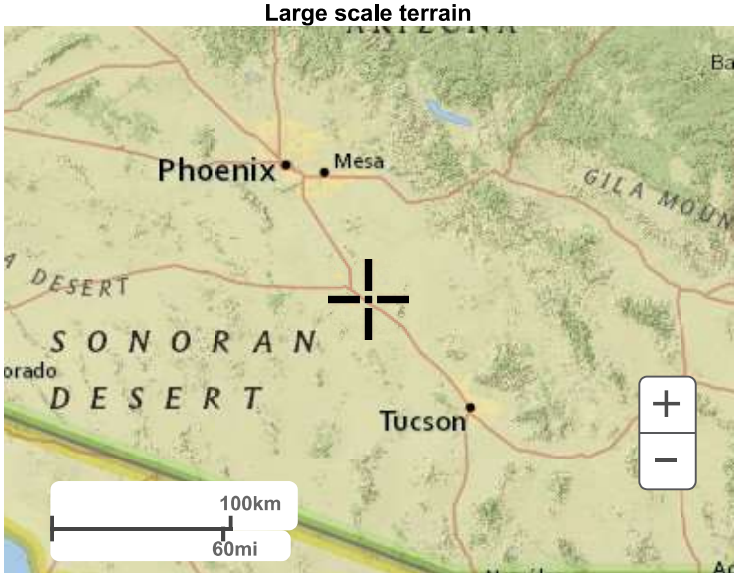
Back to Top

Maps & aerials

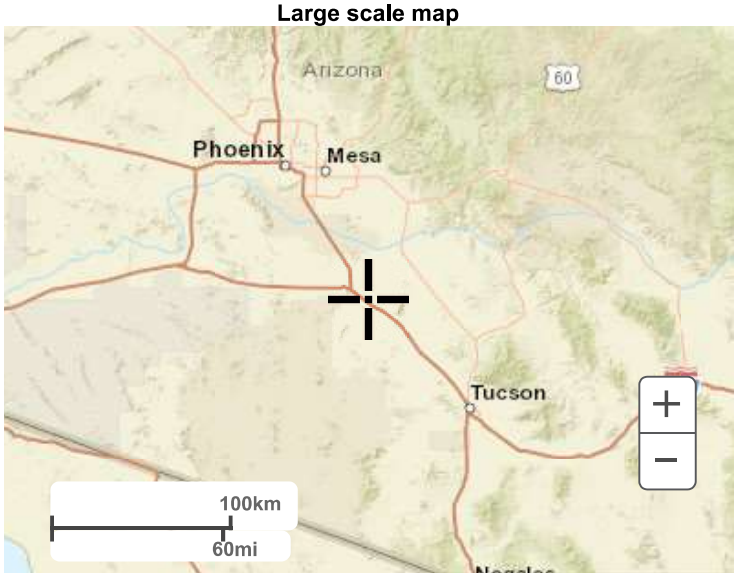
Small scale terrain



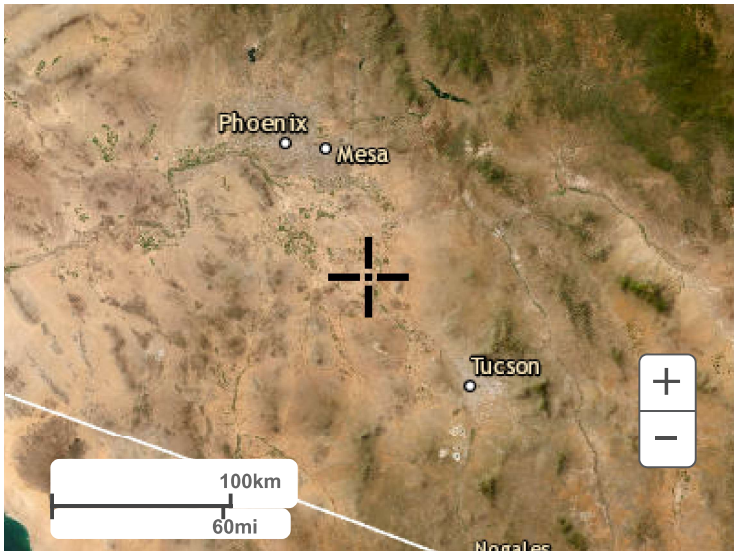
Large scale terrain



Large scale map



Large scale aerial



Back to Top

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

Disclaimer

B.2

Soils Documentation

CVL

United States Department of Agriculture

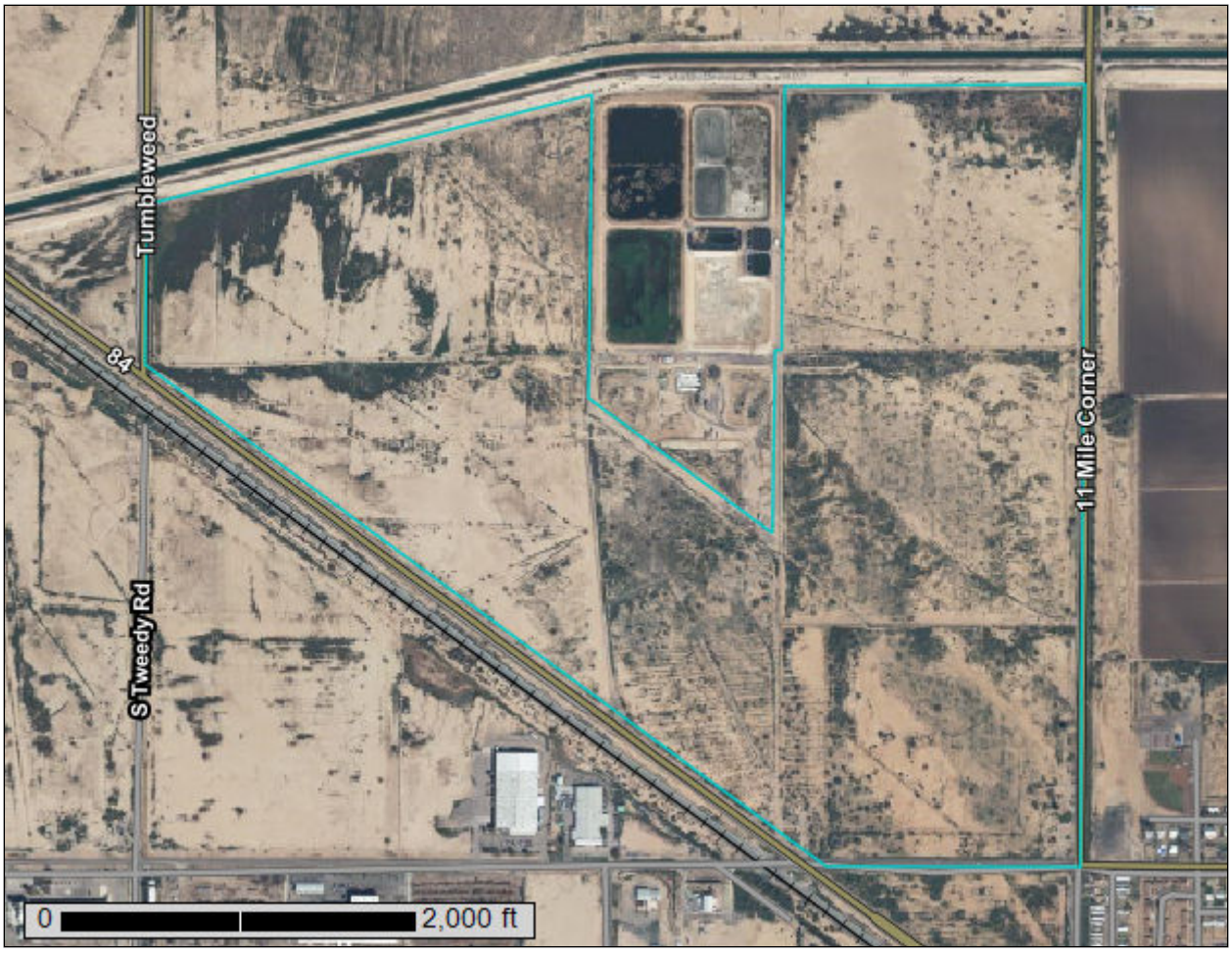
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

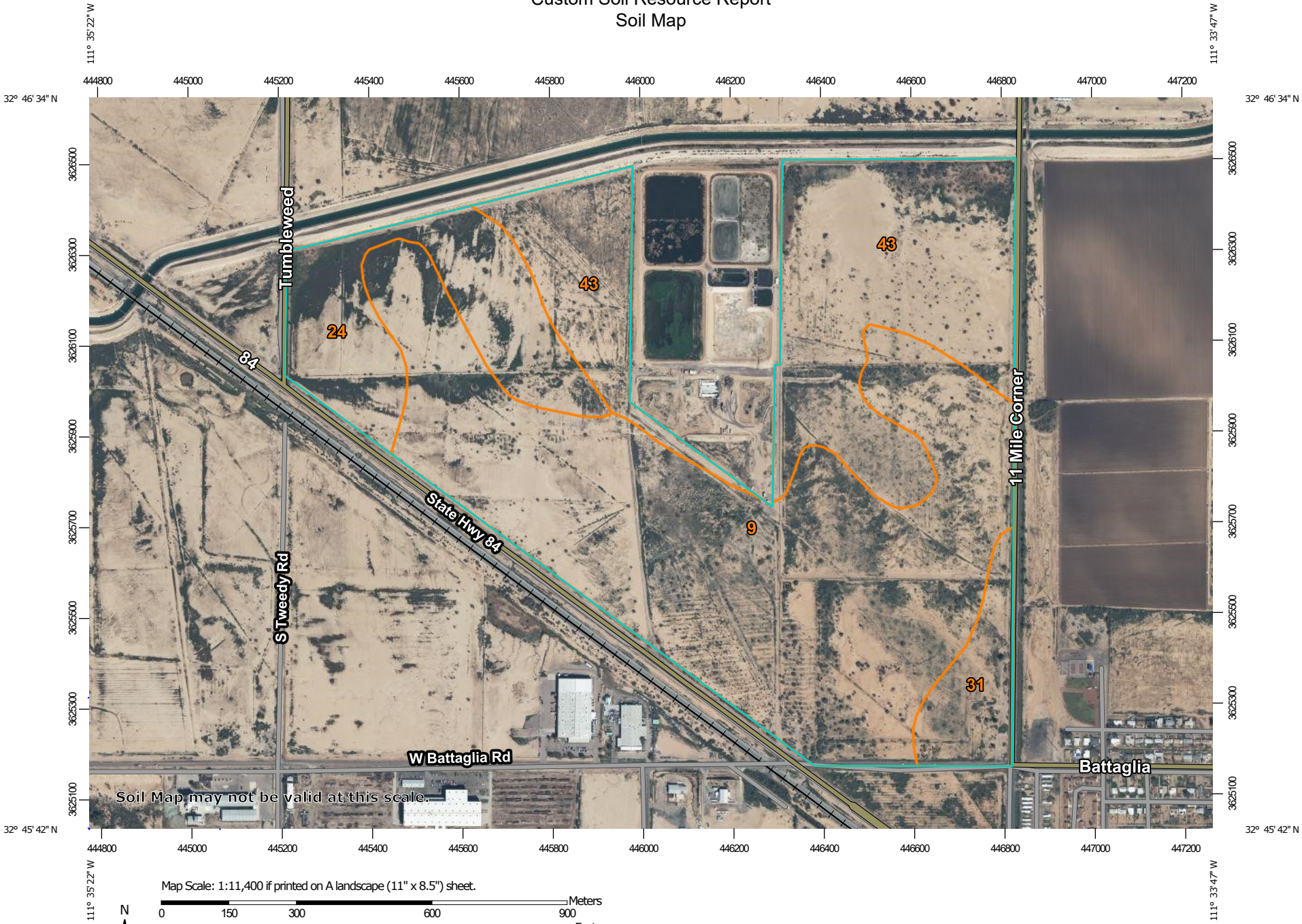
Custom Soil Resource Report for Pinal County, Arizona, Western Part

TES Eloy



August 6, 2024

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pinal County, Arizona, Western Part
Survey Area Data: Version 20, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
9	Contine clay loam	175.5	52.2%
24	Glenbar clay loam, 0 to 2 percent slopes	44.1	13.1%
31	Mohall loam MLRA 40	16.1	4.8%
43	Toltec fine sandy loam	100.7	29.9%
Totals for Area of Interest		**336.4**	**100.0%**

Map Unit Descriptions

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, 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*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one 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.

Pinal County, Arizona, Western Part

9—Contine clay loam

Map Unit Setting

National map unit symbol: 1srf
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Contine and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Contine

Setting

Landform: Fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine textured mixed fan alluvium

Typical profile

Ap - 0 to 12 inches: clay loam
Btk1 - 12 to 51 inches: clay
Btk2 - 51 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R040XB205AZ - Clay Loam Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

24—Glenbar clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tdtq
Elevation: 980 to 2,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Glenbar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Glenbar

Setting

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

Typical profile

Ap - 0 to 7 inches: clay loam
Ck1 - 7 to 18 inches: clay loam
Ck2 - 18 to 31 inches: silty clay loam
Ck3 - 31 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB211AZ - Loamy Swale 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

31—Mohall loam MLRA 40

Map Unit Setting

National map unit symbol: 2rfkt
Elevation: 1,000 to 1,990 feet
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 68 to 74 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Mohall and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mohall

Setting

Landform: Stream terraces, basin floors, fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, flat
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium

Typical profile

Ap - 0 to 16 inches: loam
Bt - 16 to 24 inches: clay loam
Btk1 - 24 to 37 inches: clay loam
Btk2 - 37 to 43 inches: clay loam
Bk - 43 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups
Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB213AZ - Loamy Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils
Percent of map unit: 20 percent
Hydric soil rating: No

43—Toltec fine sandy loam

Map Unit Setting
National map unit symbol: 1sr2
Elevation: 1,190 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Farmland of unique importance

Map Unit Composition
Toltec and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Toltec

Setting
Landform: Basin floors
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed stream alluvium and/or mixed eolian deposits

Typical profile
Ap - 0 to 12 inches: fine sandy loam

Bk - 12 to 36 inches: very fine sandy loam
Bkq - 36 to 60 inches: extremely gravelly fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: 30 percent
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 30.0
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: R040XB225AZ - Loamy Upland, Saline 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

B.3

Stormwater Retention Calculations

CVL

Retention Basin Volume Calculations (100-Year, 2-Hour)

TES Eloy Parcel - City of Eloy, Arizona

Retention [1] Drainage Area ID	Drainage Area A (acres)	Runoff [2] Coefficient C	Precipitation [3] P (inches)	Volume [4] Required V_{req} (acre-ft)	(cu-ft)
D-1	337.87	0.95	2.37	63.39	2761352
SUBTOTAL	**337.87**			**63.39**	**2,761,352**
TOTAL	**337.87**			**63.39**	**2,761,352**

References:

[1] City of Eloy. (April 8, 2024). Eloy, AZ Code of Ordinances, 15-4-15: Drainage.

[2] Pinal County. (August 2004). Pinal County Drainage Manual: Volume II Design Methodology an

Notes:

1. Site area
2. Per [1], a C-factor of 0.95 is used for the entire allowed lot coverage area.
3. Estimated 100-year, 2-hour precipitation depth, per NOAA 14 Precipitation Frequency Estimates. See Appendix A.
4. V_{req} = A x C x (P/12) = volume required for retention in acre-ft.