TUCSON
AIRPORT AUTHORITY
TUCSON INTERNATIONAL AIRPORT • RYAN AIRFIELD

Tucson Airport Authority

Ryan Airfield

Drainage Improvements Project Environmental Determination

Prepared by:
C&S Companies

October 2017

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Section 1—Introduction

1.1 Introduction

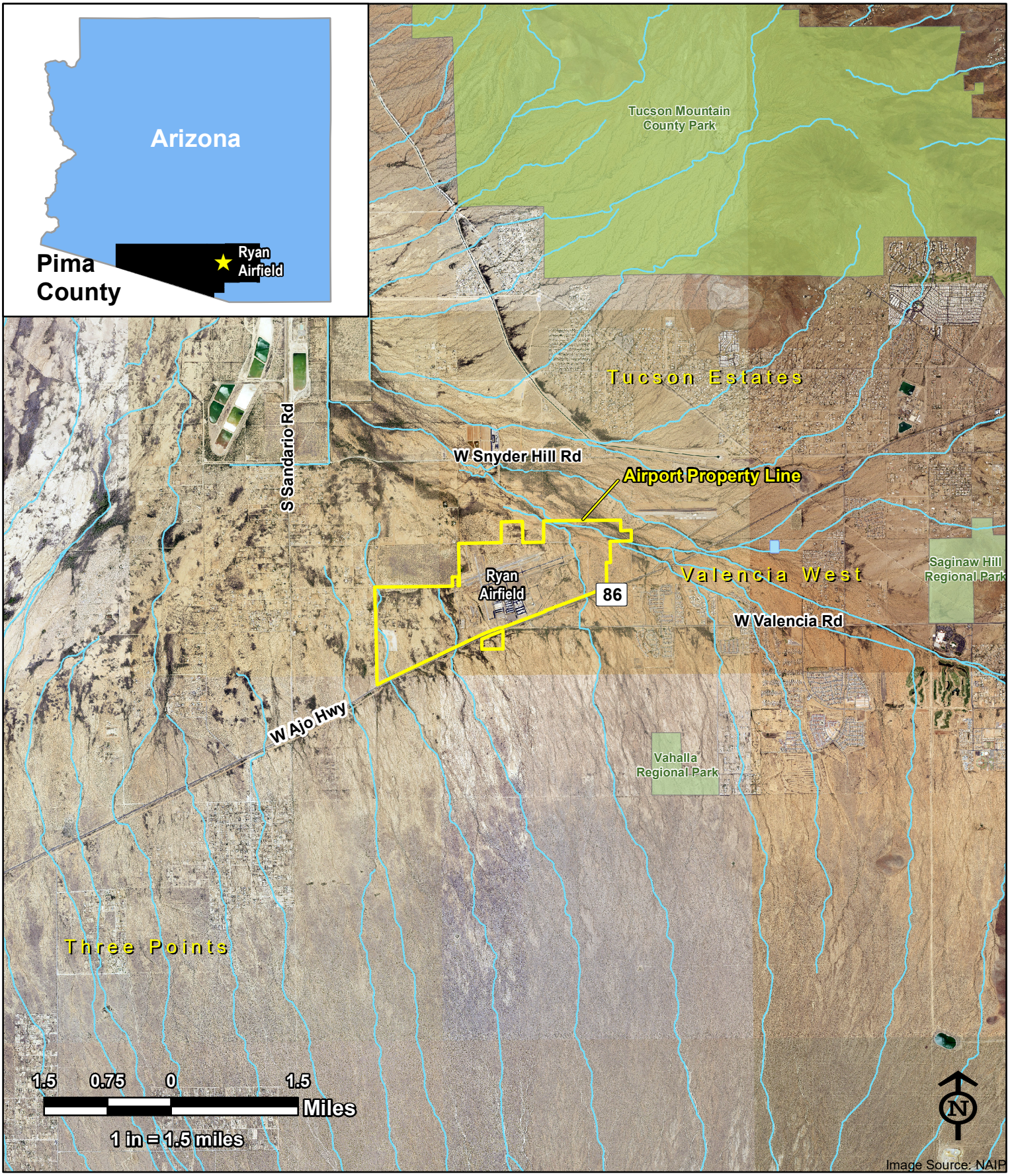
In 2006, the Tucson Airport Authority (TAA) prepared the Ryan Airfield Airport - Wide Basin Study Update Report (2006 Basin Study). The objective of the 2006 Basin Study was to provide the TAA with an updated stormwater drainage management plan for Ryan Airfield (RYN or Airport). The Basin Study indicated that areas of the airport property had been adversely affected by runoff from upstream watersheds. In order to address drainage issues identified on the southeast side of the Airport property, improvements to the existing drainage system (i.e. levee and culvert system) were recommended to protect the Airport from upstream runoff. A subsequent feasibility report was prepared in 2009 and indicated that additional improvements to an existing earthen levee used to control upstream runoff would be necessary to meet Federal Emergency Management Agency (FEMA) requirements. The recommended drainage improvements would replace the existing earthen levee and consequently remove portions of the Airport property from the 100-year floodplain and eliminate flooding of the airfield runways, taxiways, and safety areas during large rain events.

Funding for the recommended drainage improvements was evaluated and the Federal Aviation Administration (FAA) was identified as a possible funding source. Consequently, an Environmental Assessment (EA), in accordance with National Environmental Policy Act (NEPA) requirements, was deemed necessary. The TAA subsequently selected C&S Engineers, Inc. to prepare an EA utilizing the Arizona Department of Transportation (ADOT) funding.

1.2 Background

1.2.1 Airport Layout

Ryan Airfield is a general aviation reliever airport located approximately ten miles southwest of the City of Tucson at the intersection of Ajo Highway (State Route 86) and West Valencia Road within Pima County, Arizona (see **Figure 1: Vicinity Map)**. The Airport consists of three asphalt runways including two parallel runways and one crosswind (see **Figure 2: Existing Airport Layout**). Runway 6R-24L is 5,500 feet long and 75 feet wide; Runway 6L-24R is 4,900 feet long and 75 feet wide; and Runway 15-33 is 4,000 feet long and 75 feet wide. Runway 6R-24L is equipped with an Instrument Landing System (ILS) that provides pilots with precision approach capabilities. A localizer antenna, which provides horizontal guidance capabilities to the ILS system, is located on the approach end of Runway 24L. The drainage area evaluated under the 2006 Basin Study is noted on **Figure 2** as the Southeast Drainage Area.



RYAN AIRFIELD
TUCSON AIRPORT AUTHORITY

C&S COMPANIES®

Ryan Airfield
Vicinity Map
Figure 1-1

Service Layer Credits: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

RYAN AIRFIELD
TUCSON AIRPORT AUTHORITY

Airport Layout

Figure 2

1.2.2 Airport Drainage

The Airport is located within the FEMA mapped limits of the Black Wash floodplain. The existing drainage system on the eastern portion of Airport uses an earthen levee, natural swales, and box culverts located under the approach end of Runway 24L to convey water to an existing drainage swale located on the north side of the airfield. During rain events, which frequent the area during the monsoonal season, the drainage culverts located under the Runway 24L runway safety area (RSA) become overwhelmed and clogged due to debris, causing flooding within the Aircraft Operations Area (AOA) and adjacent areas.

In order to address the drainage issues found at RYN, the TAA prepared the following studies in support of the proposed drainage improvements:

- Ryan Airfield Airport-Wide Basin Study Update - In 2006, Stantec Consulting prepared the Ryan Airfield Airport-Wide Basin Study Update that was intended to address future development associated with storm-water runoff on and across the Airport. According to the study, upstream watersheds had caused erosion of airfield pavement and damaged airfield instrumentation on the east side of the Airport.
- Conditional Letter of Map Revision (CLOMR) Feasibility Study - In 2009, Stantec Consulting prepared a CLOMR Feasibility Study that was submitted to FEMA. The feasibility study concluded that the existing earthen levee did not have the freeboard required by FEMA standards and is not certified. An uncertified levee is assumed to fail by FEMA and therefore, the 100-year floodplain would extend within airfield operations areas. The CLOMR proposed a future levee and low-flow channel design and was approved by FEMA on February 8, 2011.
- Geotechnical Engineering Report – In 2010, Terracon Consultants Inc. prepared a geotechnical investigation to determine what improvements would be necessary to construction a new earthen levee further east of the existing levee.
- Preliminary Jurisdictional Determination - A Preliminary Jurisdictional Determination (PJD) was completed in 2011 and identified two braided washes within the southeast portion of the Airport property and EA study area as Potential Waters of the U.S. (WUS) (see **Appendix A - Preliminary Jurisdictional Determination**).
- Ryan Airfield Drainage Improvements Feasibility Report - In support of the EA, Stantec Consulting prepared the Ryan Airfield Drainage Improvements Feasibility Report in August, 2017. The feasibility report included an updated hydraulic analysis using FLO2-D modeling (see **Appendix B – 2017 Feasibility Report**).

Section 2—Proposed Project

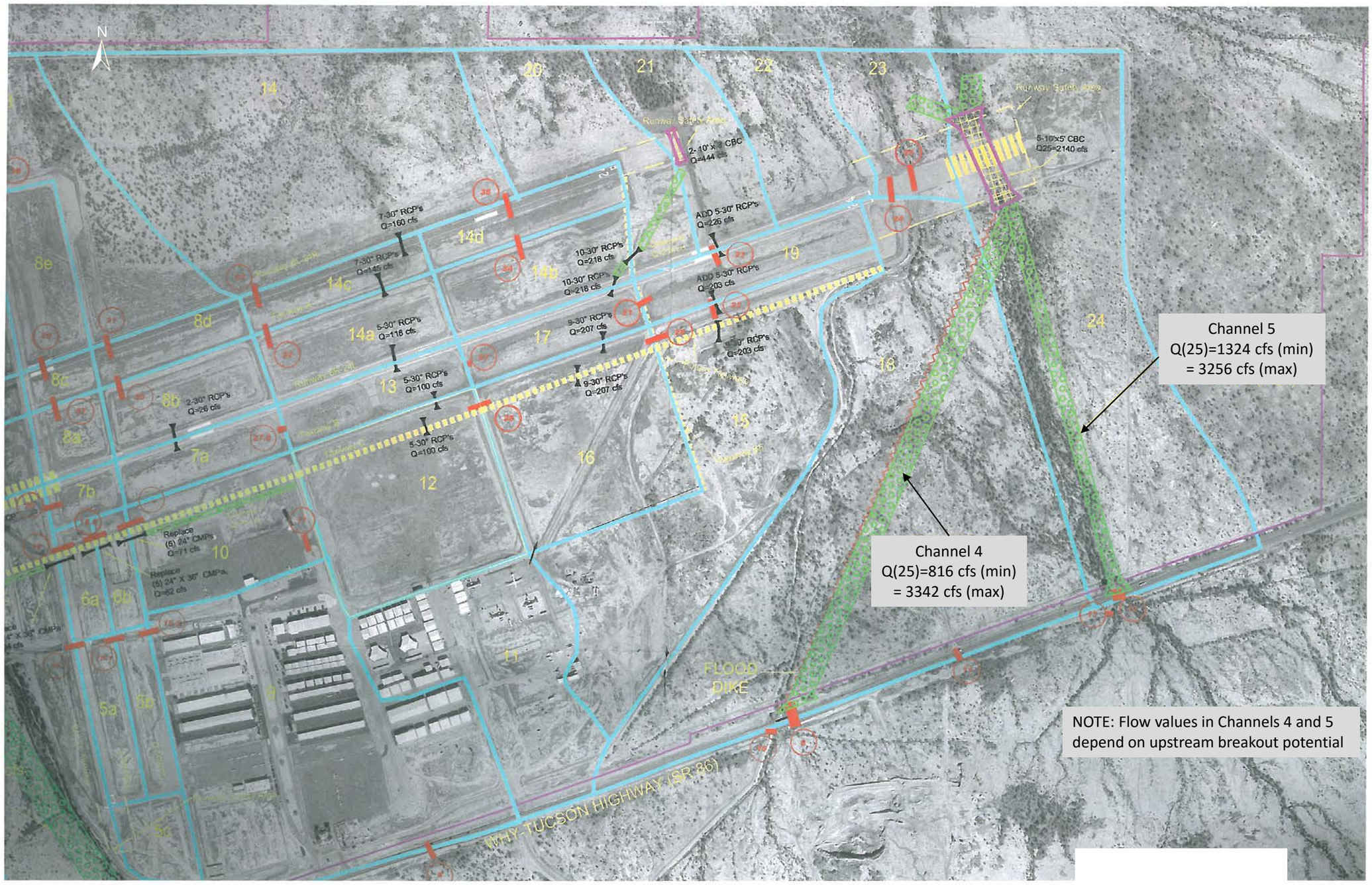
Under the 2006 Basin Study, a new alignment for the earthen levee was proposed, approximately 600 feet east of the existing levee alignment. In addition, construction of low-flow channels for the eastern and western wash were proposed in conjunction with the levee. At the northern end of the low-flow channels, concrete culverts would be constructed, below grade under the RSA, to move water around the end of Runway 6R/24L to the northside of the Airport property (**Figure 3 – 2006 Drainage Improvements**).

The proposed drainage improvements recommended in the 2006 Basin Study did not take into consideration potential impacts to the WUS identified in the 2011 PJD. Based on concerns related those potential impacts and feedback received from the FAA, United States Army Corps of Engineers (USACE) and the Pima County Flood Control additional analysis was undertaken by the TAA to determine if impacts to the WUS could be avoided.

Based on the findings of the 2017 Ryan Airfield Drainage Improvements Feasibility Report, the proposed drainage improvements (Proposed Project) were revised to include the following (see **Figure 4 - Proposed Project 15% Design**):

- Construct new earthen levee - a new earthen levee (approximately 1,300 linear ft. in length) that incorporates a concrete cut-off wall (placed 3 ft. below grade and 12 inches in width), will be constructed offset from the existing western wash.
- Improve existing earthen levee – the existing earthen levee (approximately 1,100 linear ft. in length.) would be reinforced with the placement of new/additional fill, riprap slope protection (3 ft. at 3 to 1 slope) and concrete cut-off wall (placed 3 ft. below grade and 12 inches in width) to prevent lateral migration.

The earthen levee would essentially "tie" to the existing bank protection located south of Runway 24L. Construction of low-flow channels would be omitted from the project design and the Proposed Project would take advantage of the existing drainage culverts located under the Airport service road and runway blast pad to convey water to the northside of the Airport property.

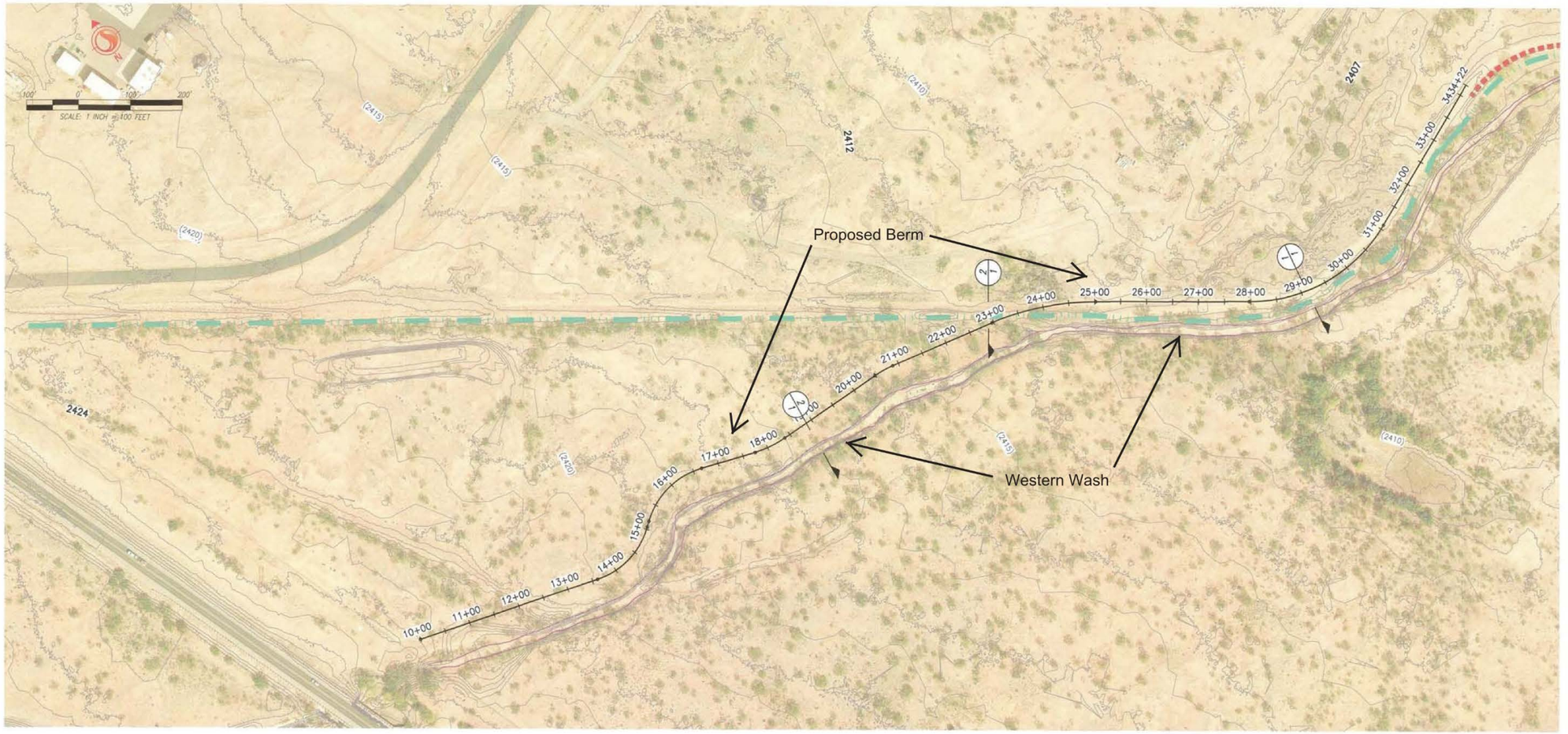


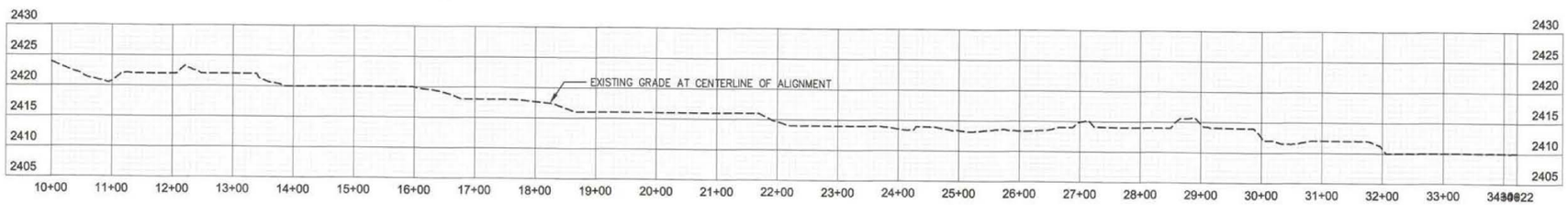
Source – Ryan Airfield Airport-Wide Basin Study Update, 2006

RYAN AIRFIELD
TUCSON AIRPORT AUTHORITY

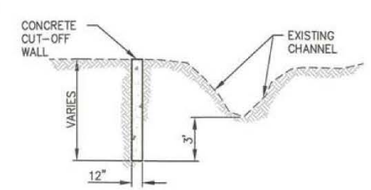
2006 Drainage Improvements

Figure 3

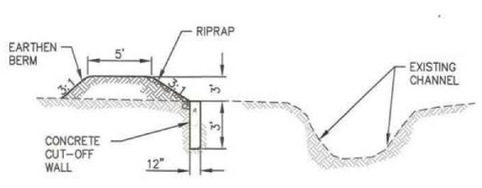




LEGEND:
- 404 LIMITS OF JURISDICTION
- 100 YR. FLOOD LIMIT
- EXISTING BANK PROTECTION



1/1 CUT-OFF WALL SECTION
N.T.S.



2/1 BERM SECTION / ALT. SECTION
N.T.S.

Source – Ryan Airfield Drainage Improvements Feasibility Report, 2017

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Proposed Project
(15 Percent Design)

Figure 4

Section 3—Agency Coordination

3.1 Meetings and Correspondence

Throughout the development of the EA ongoing coordination was undertaken with the FAA, USACE, Pima County Flood Control and Arizona Dept. of Transportation (ADOT). On-site meetings were held at the onset of the EA to update the agencies on the Proposed Project, solicit feedback on potential issues and tour the project study area. **Table 1 - Meetings & Key Correspondence** provides a summary of the meetings that were held throughout the process:

Table 3—Meetings & Key Correspondence

Date	Attendees	Notes
9/2/2015	TAA, C&S Engineers, SWCA and FAA	Meeting was held on-site at RYN to kick off the EA. Included a tour of the project study area.
1/6/2016	TAA, C&S Engineers, SWCA, Stantec and Pima County Flood Control	Meeting was held via teleconference to discuss the preliminary layout of the proposed drainage improvements. Terry Hendricks of Pima County Flood Control responded with email regarding LOMR review and approval process.
1/26/2016	TAA, C&S Engineers, SWCA, FAA, USACE, Pima County Flood Control and ADOT	Meeting was held on-site at RYN to discuss the status of EA and potential issues related to environmental resources. Included a tour of the project study area. USACE indicated a 15 percent design was necessary to evaluate possible environmental impacts and permitting requirements.
1/11/2017	Email included TAA, C&S Engineers and USACE	Email was sent to Kathleen Tucker at the USACE requesting input on permitting requirements. USACE asked for delay in response until 15 percent project design completed.
2/14/2017	Stantec and Pima County Flood Control	On-site meeting was held at Pima County Flood Control offices to discuss previous hydrologic analyses performed in the area and get approval for the use of the FLO-2D model.

Table 3—Meetings & Key Correspondence (continued)

Date	Attendees	Notes
8/10/2017	Email included TAA, C&S Engineers and USACE	Email was forwarded to Kathleen Tucker at the USACE detailing the updated Proposed Project that eliminates potential impacts to WUS.

Source: C&S Engineers, Inc. 2017

3.2 Agency Review

Based on the meeting held on January 26, 2016, it was determined that the proposed drainage improvements recommended in the 2006 Basin Study did not provide the information necessary for agency review and permit approval. The meeting was adjourned with a request by the agencies for the TAA to move forward with 15 percent design of the proposed drainage improvements prior to a follow up meeting that would be held to discuss the findings. The following provides a summary of the follow on correspondence that was held with each agency and their ultimate findings.

3.2.1 USACE

As noted in **Table 1-1**, coordination with the USACE was ongoing during the initial development of the EA and preliminary design. The USACE questioned the need for the channelization of the eastern wash and requested that preliminary design be completed due to potential impacts to WUS. If constructed as shown in the 2006 Basin Study, Section 404 permitting under the Clean Water Act would have been required. As impacts to WUS were designed out of the Proposed Project, the USACE made an ultimate finding that no Section 404 permitting would be required. A "no permit required" letter was provided by Michael Langley of the USACE on September 13, 2017 (see **Appendix C – USACE Coordination**).

3.2.2 Pima County Flood Control

Portions of the Proposed Project will take place within the 100-year floodplain (see **Appendix D – FEMA Floodplain Maps**). Consequently, the Pima County Flood Control District was kept apprised of project developments. This included gaining approval to allow for FLO-2D to be used for the hydrologic/hydraulic modeling that determined what improvements were necessary to address potential flooding.

Based on the FLO-2D drainage modeling, the Proposed Project will potentially allow for portions of the Airport property to be removed from the 100-year floodplain. The TAA plans to submit a Letter of Map Revision (LOMR) to FEMA requesting adjustments to the 100-year floodplain limits once full design of the Proposed Project has been completed.

3.2.3 FAA

Due to potential environmental impacts related to the construction of the proposed drainage improvements recommended in the 2006 Basin Study, an EA was initiated by the TAA to meet NEPA requirements. Environmental Protection Specialists from the FAA Phoenix-Airport District Office (PHX-ADO) were briefed on the proposed drainage improvements. During the meeting held at RYN on January 26, 2016, FAA agreed with the USACE and requested that a preliminary 15 percent design be completed on the proposed drainage improvements to gain a better understanding of potential impacts and address alternatives that may reduce them.

After the 15 percent design was completed on the Proposed Project, it was determined that impacts to WUS could be avoided. In addition, a biological evaluation (see **Appendix E – Biological Evaluation**) and archaeological survey (see **Appendix F – Archaeological Survey**) completed for the project study area found that there were no potential impacts to threatened and endangered species or historic/cultural resources. Consequently, it was determined that potential environmental impacts from the Proposed Project could be fully evaluated using a Categorical Exclusion (CATEX), rather than an EA. A CATEX was submitted to, and approved by the FAA PHX-ADO in September 2017 (see **Appendix G – FAA CATEX Approval**).

Appendix A – Preliminary Jurisdictional Determination

Prepared by Army Corps of Engineers, 2011

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
TUCSON RESIDENT OFFICE
5205 EAST COMANCHE STREET
TUCSON, ARIZONA 85707

December 14, 2011

REPLY TO
ATTENTION OF
Office of the Chief
Regulatory Division

Mr. Fred E. Brinker
Tucson Airport Authority
7005 S. Plumer Avenue
Tucson, Arizona 85706

SUBJECT: Preliminary Jurisdictional Determination regarding the presence of geographic jurisdiction (File No. SPL-2011-000789-JWL)

Dear Mr. Brinker,

I am responding to your request (File No. SPL-2011-000789-JWL) for a Department of the Army preliminary jurisdictional determination (PJD) for Ryan Airfield. The site is located (Sections 11-13, T15S, R11E,) and (Section 7, T15S, R12E) of the Gila and Salt River Baseline Meridian, Pima County, Arizona.

The Corps' evaluation process for determining whether or not a Department of the Army permit is needed involves two tests. If both tests are met, then a permit is required. The first test determines whether or not the proposed project is located in a water of the United States (i.e., it is within the Corps' geographic jurisdiction). The second test determines whether or not the proposed project is a regulated activity under Section 404 of the Clean Water Act. As part of the evaluation process, pertaining to the first test only, we have made the jurisdictional determination below.

Based on available information, the proposed project site may contain Waters of the United States in the approximate locations noted on the enclosed figures. The basis for the preliminary JD can be found on the enclosed "Preliminary Jurisdictional Determination Form." Please sign and date this form and return to the issuing office within fifteen (15) days of receipt. Please note preliminary JDs are non-binding, written indications that there may be waters of the United States, including wetlands, on a parcel or indications of the approximate location(s) of waters of the United States or wetlands on a parcel. Preliminary JDs are advisory in nature and may not be appealed (33 C.F.R. 331.2). The party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination for this site. The option to obtain an approved JD in this instance and at this time has been declined. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S.

Please be reminded that preliminary JDs may not be appealed through the Corps' administrative appeal process set out at 33 CFR Part 331. Preliminary jurisdictional determinations are fully explained in Regulatory Guidance Letter 08-02, dated June 26, 2008. Further, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

This determination has been conducted to identify the extent of the Corps' Clean Water Act jurisdiction within the proposed project site. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

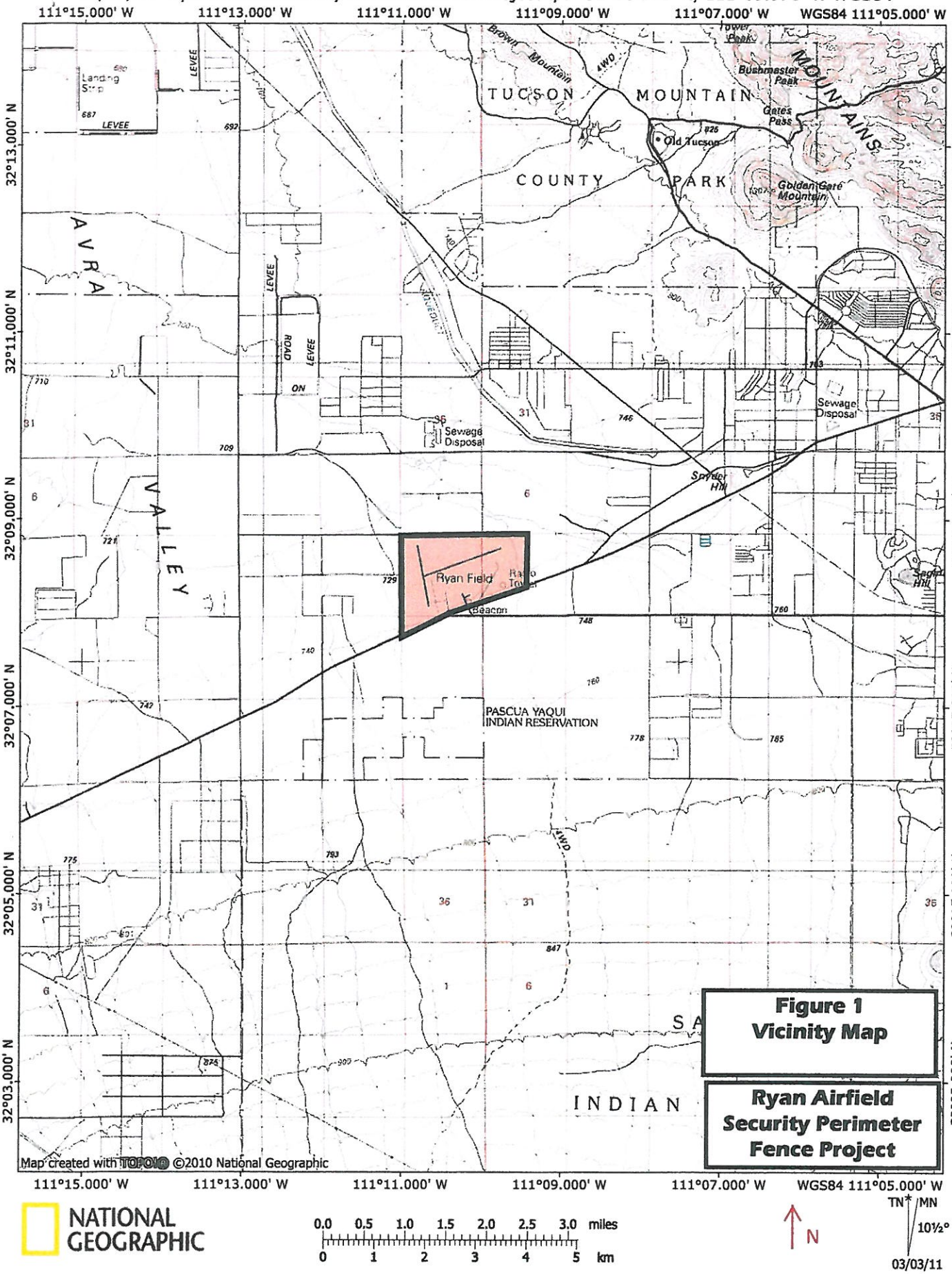
If you have any questions, please contact me at (520) 584-1677 or via e-mail at Jesse.Laurie@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

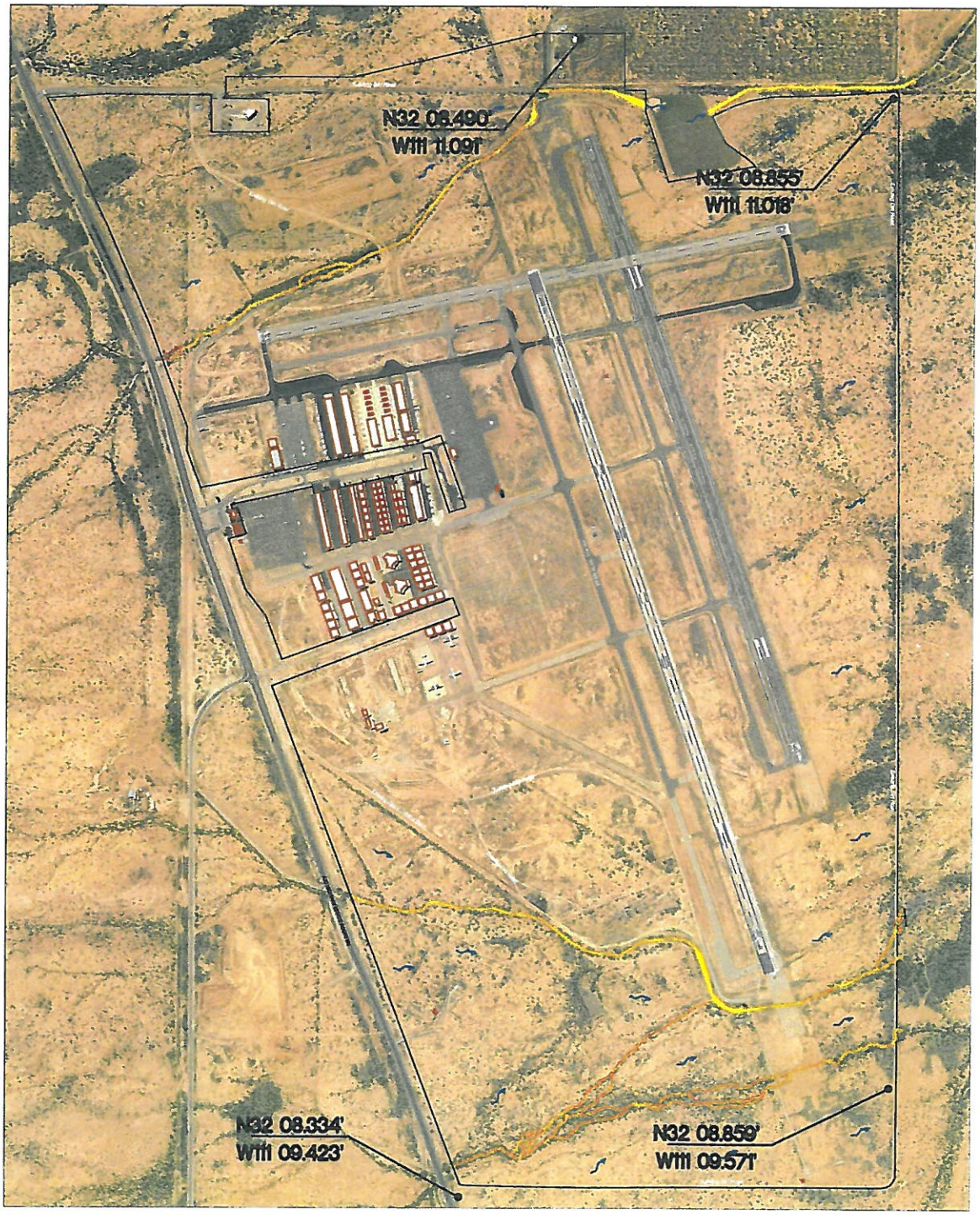
Sincerely,

Jesse W. Laurie, R.G.
Project Manager
Arizona Branch, Regulatory Division

Enclosures


03/03/11 "Ryan Airfield Security Perimeter Fence Project.tpo" 32°08.171' N, 111°09.978' W WGS84
111°15.000' W
111°13.000' W
111°11.000' W
111°09.000' W
111°07.000' W
WGS84 111°05.000' W
32°13.000' N
32°11.000' N
32°09.000' N
32°07.000' N
32°05.000' N
32°03.000' N
TUCSON MOUNTAIN PARK
MOUNTAINS
AVRA VALLEY
COUNTY
Brown Mountain
Tower Peak
Bushmaster Peak
Gates Pass
Old Tucson
Golden Gate Mountain
Landing Strip
LEVEE
ROAD
Sewage Disposal
Ryan Field
Beacon
Spyder Hill
PASCUA YAQUI INDIAN RESERVATION
INDIAN
Map created with TOPO! ©2010 National Geographic
NATIONAL GEOGRAPHIC
0.0 0.5 1.0 1.5 2.0 2.5 3.0 miles
0 1 2 3 4 5 km
N
TN* /MN
10½°
03/03/11
Figure 1
Vicinity Map
Ryan Airfield
Security Perimeter
Fence Project

RYAN AIRFIELD
SECURITY PERIMETER FENCING AND ROADWAY
TAA# 201006591

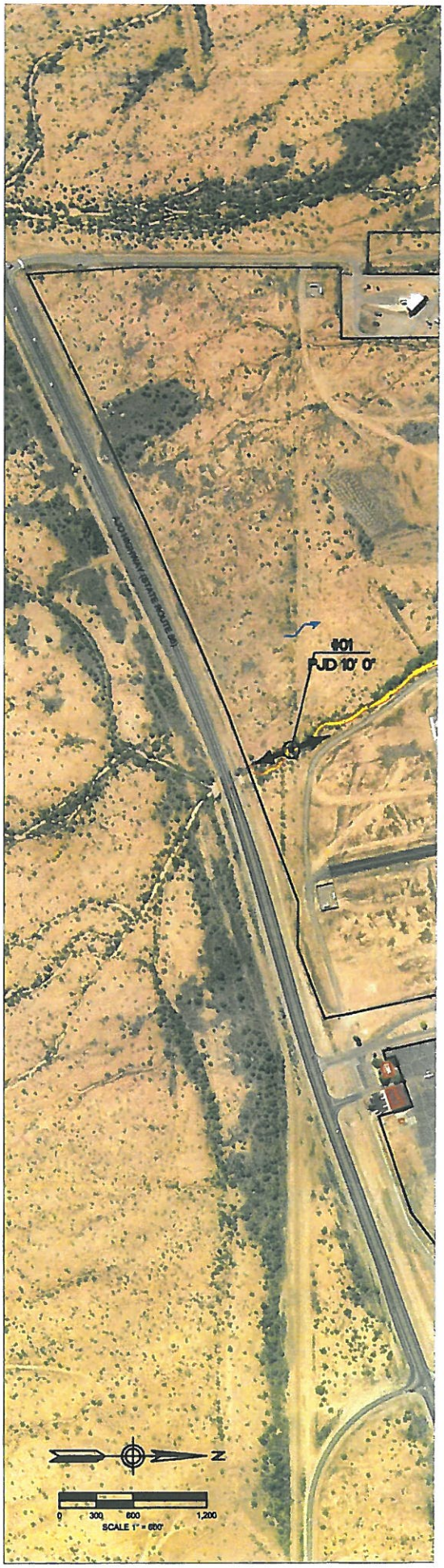


PLAN VIEW
NOT TO SCALE

PREPARED BY:	PREPARED FOR:	PREPARED:	RYAN AIRFIELD
BOWERS ENVIRONMENTAL CONSULTING 2164 NORTH JACANA LOOP TUCSON, ARIZONA 85745 (520) 909-8604	PSOMAS ENGINEERING 800 E. WETMORE ROAD, SUITE 110 TUCSON, ARIZONA 85719 (520) 292-2300	02/22/11 BEC Proj. No. TBA	PROJECT AREA EXIBIT & EXTENTS

1	20 DECEMBER 2010	UPDATED JD WORK (BOWERS ORIGINAL)	T. CASTELL	R. BOWERS	R. BOWERS
2	31 JANUARY 2011	EXTENDED PJD TO MATCH UPDATE DRAWINGS	T. CASTELL	R. BOWERS	R. BOWERS
3	18 FEBRUARY 2011	REALIGN PJD TO MATCH IMAGE & EXTENTS	T. CASTELL	R. BOWERS	R. BOWERS
5	3 MARCH 2011	CONVERT DRWG TO 11X17	T. CASTELL	R. BOWERS	R. BOWERS

RYAN AIRFIELD JURISDICTIONAL DELINEATION WASH "A"



Drainage Information				
Drainage ID	Length	Area, sqft	Area, acres	Jurisdictional Status
A	6,966 lf	115,522.53	2.65 acres	PJD

LEGEND

Sheet Flow Direction

PH No. PJD — Photo Point, Direction, and Width

*** * * * PRELIMINARY (RGL 08-02) * * * ***

SECTION 404 JURISDICTIONAL DELINEATION

U.S. Army Corps of Engineers, Los Angeles District

Application No. SPL-2011-00759-JWL

Boundary of area surveyed for jurisdictional waters of the United States

Approximate Ordinary High Water Mark

Potential Waters of the United States

N/A — Potential Wetlands (If legend is blank no wetlands occur with survey area.)

No Site Visit (Y/N) Date: _____

1"=600' Scale 21 Apr 2005 Date of Photograph

J. LAURIE Corps Project Manager

Sheet 2 of 3

*** * * * PRELIMINARY (RGL 08-02) * * * ***

BOWERS ENVIRONMENTAL CONSULTING
Regulatory Compliance and Permitting
Tucson Office
2184 North Jacana Loop, Tucson, Arizona 85745
(520) 909-6604

Figure 2 of 3

APPROVALS	SIGNATORY	DATE

REF. TBA TBA SCALE: 1"=600'

PROJECT NO. TBA

Graphics and CAD by: Sonoran Enviro Tech

Sonoran Enviro Tech Job No. 604-0 File: /Project Folders/Bowers Consulting/Ryan Airfield/CAD Folder/Ryan Airfield JD.dwg

1	20 DECEMBER 2010	UPDATED JD WORK (BOWERS ORIGINAL)	T. CASTELL	R. BOWERS	R. BOWERS
2	31 JANUARY 2011	EXTENDED PJD TO MATCH UPDATE DRAWINGS	T. CASTELL	R. BOWERS	R. BOWERS
3	18 FEBRUARY 2011	REALIGN PJD TO MATCH IMAGE & EXTENTS	T. CASTELL	R. BOWERS	R. BOWERS
3	3 MARCH 2011	CONVERT DWG TO 11X17	T. CASTELL	R. BOWERS	R. BOWERS

RYAN AIRFIELD JURISDICTIONAL DELINEATION WASH "B" AND WASH "C"

Drainage Information

Drainage ID	Length	Area, sqft	Area, acres	Jurisdictional Status
B	5,244 lf	93,871.69	2.15 acres	PJD
C	7,233 lf	57,751.33	1.31 acres	PJD
C-1	1,926 lf	12,830.22	0.29 acres	PJD

LEGEND

Sheet Flow Direction

PH No. PJD — Photo Point, Direction, and Width

*** * * * PRELIMINARY (RGL 08-02) * * * ***

SECTION 404 JURISDICTIONAL DELINEATION

U.S. Army Corps of Engineers, Los Angeles District

Application No. SPL-2011-00759-JWL

Boundary of area surveyed for jurisdictional waters of the United States

Approximate Ordinary High Water Mark

Potential Waters of the United States

N/A — Potential Wetlands (If legend is blank no wetlands occur with survey area.)

N Site Visit (Y/N) Date: _____

1"=600' Scale 21 Apr 2005 Date of Photograph

J. LAURIE Corps Project Manager

Sheet 3 of 3

*** * * * PRELIMINARY (RGL 08-02) * * * ***

BOWERS ENVIRONMENTAL CONSULTING
Regulatory Compliance and Permitting
Tucson Office
2194 North Jacana Loop, Tucson, Arizona 85745
(520) 909-6904

Figure 3 of 3

APPROVALS	SIGNATORY	DATE

REF. TBA TBA SCALE: 1"=600'

PROJECT NO. TBA

Graphics and CAD by: Sonoran Enviro Tech

Sonoran Enviro Tech Job No. 604-10 File: /Project Folders/Bowers Consulting/Ryan Airfield/CAD Folder/Ryan Airfield .Dwg

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: Los Angeles District | File/ORM #: SPL-2011-000789-JWL | PJD Date: Dec 14, 2011

State: AZ | City/County: Tucson, Pima County

Nearest Waterbody: Black Wash

Location: TRS, LatLong or UTM: T15S, R11E, S11, 12, 13
T15S, R12E, S7

Name/ Address of Person Requesting PJD:
Fred E. Brinker
Tucson Airport Authority
7005 S. Plumer Avenue
Tucson, Arizona 85706

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: 21,405 linear ft | width 6.22 acres | Stream Flow: Ephemeral

Wetlands: 0 acre(s) | Cowardin Class: Riverine

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: N/A | Non-Tidal: N/A

☑ Office (Desk) Determination
☐ Field Determination: Date of Field Trip:

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: BOWERS ENVIRONMENTAL CONSULTING
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☐ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name: Brown Mountain
- ☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
- ☐ National wetlands inventory map(s). Cite name:
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is:
- ☐ Photographs: ☑ Aerial (Name & Date): April 2005
  ☑ Other (Name & Date): Ground Level December 2010
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

Sign & retain for your records

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

14 Dec 11

Signature and Date of Regulatory Project Manager (REQUIRED)

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Appendix A - Sites

District Office	Los Angeles District	File/ORM #	SPL-2010-000789-JWL	PJD Date:	Dec 14, 2011
State	AZ	City/County	City of Tucson, Pima County	Person Requestinq PJD	TUCSON AIRPORT AUTHOURITY

Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
A	33.132770	-111.177047	Riverine	2.65 ACRES	Non-Section 10 non-wetlan
B	32.136414	-111.164338	Riverine	2.15 ACRES	Non-Section 10 non-wetlan
C	32.138772	-111.157850	Riverine	1.13 ACRES	Non-Section 10 non-wetlan
C1	32.143018	-111.161296	Riverine	0.29 ACRES	Non-Section 10 non-wetlan
			n/a		
			n/a		

Notes:

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: Los Angeles District | File/ORM #: SPL-2011-000789-JWL | PJD Date: Dec 14, 2011

State: AZ | City/County: Tucson, Pima County

Nearest Waterbody: Black Wash

Location: TRS, LatLong or UTM: T15S, R11E, S11, 12, 13
T15S, R12E, S7

Name/ Address of Person Requesting PJD: Fred E. Brinker
Tucson Airport Authority
7005 S. Plumer Avenue
Tucson, Arizona 85706

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: 21,405 linear ft | width 6.22 acres | Stream Flow: Ephemeral

Wetlands: 0 acre(s) | Cowardin Class: Riverine

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: N/A | Non-Tidal: N/A

☑ Office (Desk) Determination
☐ Field Determination: Date of Field Trip:

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: BOWERS ENVIRONMENTAL CONSULTING
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☐ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name: Brown Mountain
- ☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
- ☐ National wetlands inventory map(s). Cite name:
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is:
- ☐ Photographs: ☑ Aerial (Name & Date): April 2005
  ☑ Other (Name & Date): Ground Level December 2010
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

Sign & return to Corps

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

J.W. 14 Dec 11

Signature and Date of Regulatory Project Manager (REQUIRED)

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

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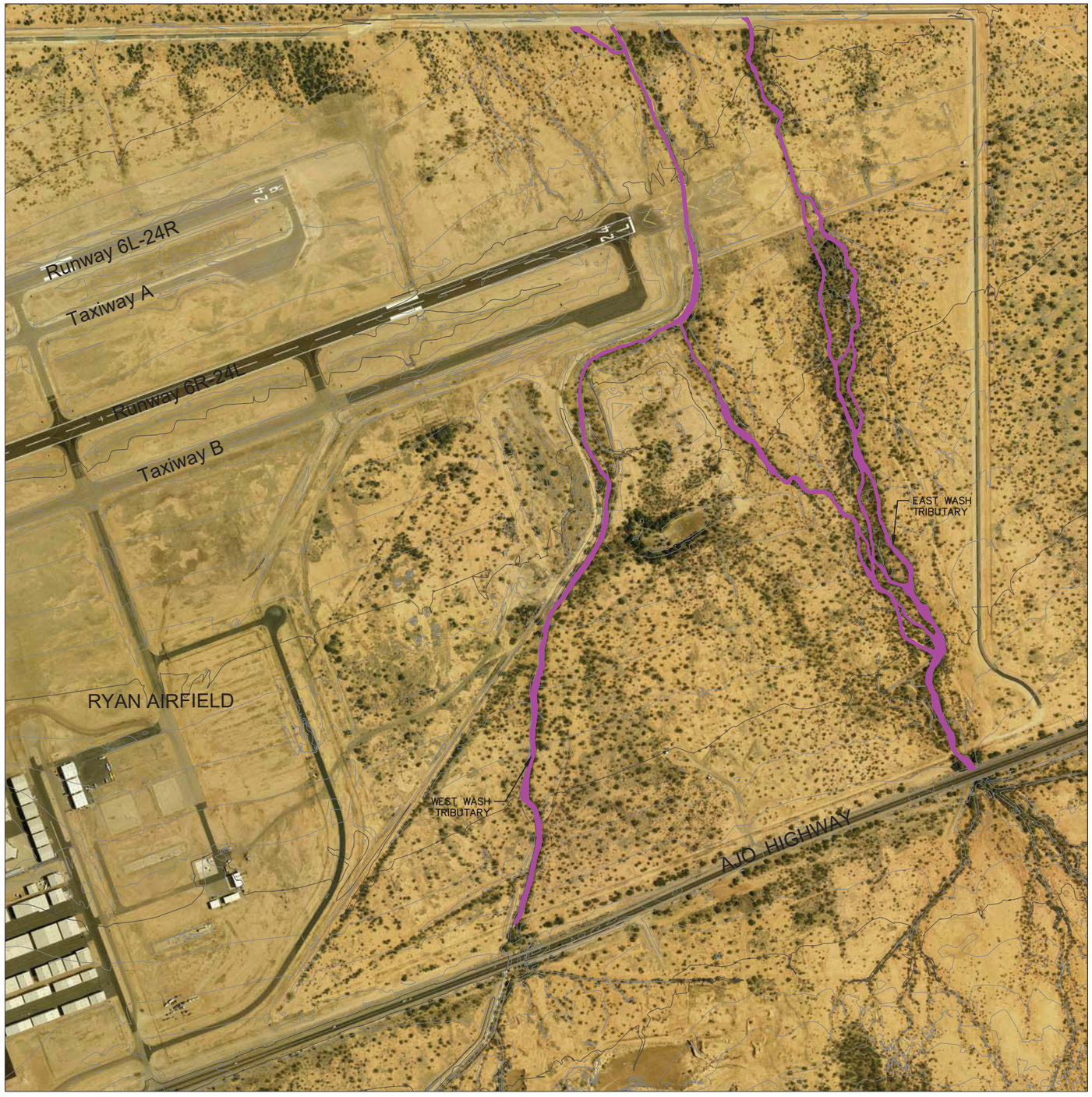
B	32.136414	-111.164338	Riverine	2.15 ACRES	Non-Section 10 non-wetlan
C	32.138772	-111.157850	Riverine	1.13 ACRES	Non-Section 10 non-wetlan
C1	32.143018	-111.161296	Riverine	0.29 ACRES	Non-Section 10 non-wetlan
			n/a		
			n/a		

Notes:



2011 ACOE 404 Jurisdictional Limits

N

250' 0' 250' 500'

SCALE: 1 INCH = 250 FEET

LEGEND

404 JD's

Stantec

Street Address
City, Prov/Stantc Country Code/Zip
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By	Appd.	YY.MM.DD

Client/Project
RYAN AIRFIELD

RYAN AIRFIELD CONCEPT DRAINAGE IMPROVEMENTS
LEVEE ALIGNMENT
City, State/Prov
404 DRAINAGE EXHIBIT

Permit-Seal

Project Number: 181304016
File Name: drawing.dwg

RLM	JSW	RB	11-29-2016
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. dwg no
Revision Sheet

FIG: 1a

1 of 1

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2017/07/12 7:20PM by Mark Abbett

Appendix B – 2017 Feasibility Report

Prepared by Stantec Consulting, 2017

RYAN AIRFIELD DRAINAGE IMPROVEMENTS FEASIBILITY REPORT

181304016

Prepared for:
Tucson Airport Authority

Report Prepared by:
Jenny Laber, CFM

Under the Supervision of:
John S. Wise, PE, CFM

August 9, 2017

TABLE OF CONTENTS

EXHIBITS

RYAN AIRFIELD
DRAINAGE IMPROVEMENTS
FEASIBILITY REPORT

August 9, 2017

1.0 INTRODUCTION

Stantec Consulting was contracted with Tucson Airport Authority (TAA) to address the U.S. Army Corps of Engineers (ACOE) impacts from the proposed flood control levee system (Proposed Project) at Ryan Airfield (RYN). The TAA is currently completing the necessary analysis to meet National Environmental Policy Act (NEPA) requirements for the Proposed Project, which includes the ACOE Section 404 Permitting coordination. A Preliminary Jurisdictional Determination (PJD) was completed in 2011 and identified two braided washes within the study area as Potential Waters of the U.S. See Figure 1a, 2011 ACOE 404 Jurisdictional Limits. In addition, this study included the feasibility and potential environmental impacts associated with the construction of drainage improvements at Ryan Airfield; specifically, within the southwest corner of the airport property, to replace an existing earthen berm currently used to confine the 100-year flow from nearby tributaries. See Figure 1, Location Map.

Stantec history at Ryan Airfield includes the following:

- In 2006, Stantec Consulting prepared a Ryan Airfield Airport-Wide Basin Study Update (Drainage Master Plan). This study was intended to address future development associated with stormwater runoff on and across Ryan Airfield. See Figure 2, Concept Drainage Improvements, Drainage Master Plan 2006.

- A subsequent Conditional Letter of Map Revision (CLOMR) was prepared in 2009 and submitted to the Federal Emergency Management Association (FEMA) prior to any structural drainage improvements at the site. The CLOMR was based on a future levee and low-flow channel design and was approved by FEMA on February 8, 2011. See Figure 3, Effective FEMA FIRM, 2011.

A summary of peak discharges associated with the Drainage Master Plan, 2006, and the CLOMR, 2009, are listed in Table 1.

Table 1

Source	Q100 (cfs)
Drainage Master Plan, based on HEC-1 by Stantec	2,457 (total)
CLOMR, based on HEC-1 by others (detailed study)	4,578 (total)

The current proposed drainage improvements have been altered from the original 2009 CLOMR and are discussed within this feasibility report.

2.0 HYDRAULIC MODELS

Approximate 100-year water surface elevations for the onsite channels on the east side of Ryan Airfield were originally modeled utilizing HEC-2 as part of the Drainage Master Plan, dated March 2006, prepared by Stantec. The HEC-2 analyses had been conducted to identify limits of floodplain and develop preliminary finished floor elevations for future development.

In December 2009, Stantec prepared a CLOMR for Ryan Airfield. This CLOMR was prepared to address the existing earthen levee (not certified per FEMA standards) on the east side of the airfield and propose an alternative engineered levee to remove the airfield/aviation support areas from the FEMA floodplain. This CLOMR analysis was the first Ryan Airfield study to incorporate the HEC-1 watershed analyses prepared by JE Fuller (total discharge equal to 4,578 cfs).

As part of this feasibility report, hydraulic modeling of the eastern drainageways was conducted by Stantec utilizing HEC-RAS. Multiple HEC-RAS models were analyzed incorporating the discharges noted within the ADOT SR 86 study (HMS modeling by J2 Engineering, total discharge equal to 7,968 cfs). Specifically, the HMS model established 5,302 cfs at the westernmost 7-cell RCBC and 2,666 cfs at the 6-cell RCBC along Ajo Highway south of Ryan Airfield (culverts under SR 86 immediately south of and adjacent to Ryan Airfield).

The original HEC-RAS model utilized the 100-peak discharge of 7,968 cfs identified within the SR 86 Design Concept Report. A secondary HEC-RAS model was analyzed utilizing 5,302 cfs (peak flow at the westernmost 7-cell RCBC) to determine the potential impact on just the west wash tributary, see Figure 1a.

3.0 USACOE JURISDICTIONAL WATERWAYS IMPACTS

The 2011 PJD affected the aforementioned 2009 CLOMR levee design with the original levee alignment traversing the Section 404 jurisdictional waterways. As a part of this feasibility report, the TAA requested that a new levee alignment be researched and considered.

The original CLOMR levee alignment would impact greater than 0.5 acres of Section 404 jurisdictional waterways resulting in the need for an ACOE Section 404 Individual Permit. Three alternative levee alignments were studied that greatly reduced the impacts to the onsite Section 404 jurisdictional waterways, and created the opportunity to incorporate the drainage improvements under the umbrella of a Section 404 Nationwide Permit. See Figures 4 through 7, Levee Alternative Alignments.

Alternative levee alignments were analyzed considering current channel geometry, jurisdictional 404 limits, levee standards, biology, and existing improvements. Levee alignment alternatives ranged from: 1) minor modifications to the previous CLOMR configuration, 2) a levee parallel to the existing west tributary from the Ajo Highway RCBC's to a location north of the runway, and 3) a levee parallel to the existing west tributary from the SR 86 right-of-way terminating near the south taxiway. Figure 7 is a compilation of the three potential alignments shown on Figures 4, 5 and 6.

4.0 PIMA COUNTY REGIONAL FLOOD CONTROL DISTRICT COORDINATION

After discussion with the TAA, Stantec met with Pima County Regional Flood Control District (PCRFCD) staff. The initial conversation concerned the new levee alternatives. However, the PCRFCD provided recent Letter of Map Revision (LOMR) studies that were completed by others and approved by FEMA. The significance was in the hydrologic/hydraulic modeling for the two LOMRs; FLO-2D was utilized and accepted by FEMA. The two LOMR locations are immediately upstream of Ajo Highway. See Figure 8 and 9, Upstream LOMRs prepared by CMG Engineering and JE Fuller.

Discharges impacting Ajo Highway were established as part of the Initial Drainage Report, SR 86: Sandario Road to Kinney Road, dated July 2007, prepared by J2 Engineering and Environmental Design. Through research of the plans and proposed discharges, it was determined that the J2 Engineering discharges had been significantly updated for the final roadway design. Additional discussion with PCRFCD staff regarding the current Ajo Highway design plans provided information relating to a drainage study conducted by JE Fuller for Ajo Highway drainage improvements. In conjunction with value engineering efforts associated with the SR 86 cross drainage structures, JE Fuller revised the hydrologic analysis utilizing FLO-2D in 2012. FLO-2D was selected because it more accurately simulates the relatively shallow, unconfined, dispersed flow conditions found within the watersheds upstream of Ajo Highway. The resulting peak discharges are documented within the JE Fuller FLO-2D Hydrology Analysis for Arizona State Route 86, Valencia Road to Kinney Road, Pima County, Arizona October 2012.

Stantec obtained the aforementioned study by JE Fuller from ADOT. The 100-year peak flow rates determined in the FLO-2D study were significantly reduced from previous studies. A summary of peak discharges associated with the Drainage Master Plan, 2006, the CLOMR, 2009, and the FLO-2D Model, 2012, are listed in Table 2.

Table 2

Source	Q100 (cfs)
Drainage Master Plan, based on HEC-1 by Stantec	2,457 (total)
CLOMR, based on HEC-1 by others (detailed study)	4,578 (total)
Initial Ajo Higway Drainage Study (HMS), J2 Engineering, 2007*	7,968 (total)
Ajo Highway FLO-2D by JE Fuller	**1,580 (total)**
Culverts impacting Ryan Airfield	**350cfs @7-cell RCBC and 1,230 cfs @6-cell RCBC**

*The Ajo Highway box culverts were evaluated for the 100-year peak flows provided in the *Initial Drainage Report, SR 86, 2007*

5.0 NEW ONSITE BERM 15% DESIGN

With the reduction in peak flow and the acceptable use of FLO-2D modeling, the need for an onsite levee and low-flow channel design was eliminated. The proposed onsite drainage improvement consists of an earthen berm with cut-off wall. No impacts to the onsite PJD is anticipated. Presently, there is a version of an earthen berm within the west portion of the Ryan Airfield property north of Ajo Highway. Figure 15, Earthen Berm Alternative Alignment #4, illustrates extending /improving the existing earthen berm and adding an additional berm alignment that would depart from the current berm alignment and parallel the westernmost tributary (404 corridor). Therefore; the 4th alignment alternative is a combination of improvements to the existing earthen berm including placement of new/additional fill, riprap slope protection and concrete cut-off wall, a new berm incorporating riprap slope protection and concrete cut-off wall, and, where applicable, concrete cut-off wall only to prevent lateral migration. The alternative 4 option would essentially "tie" to the existing bank protection located south of the taxiway.

The final recommended improvements are based upon the alternative 4 option with the preferred alternative being a singular earthen berm to be built parallel to the westernmost Section 404 jurisdictional limits (see Figure 15a, Preferred Berm Alignment). The benefit of incorporating this parallel berm alignment, and eliminating the existing earthen berm altogether, is the ability to recover developable acreage currently impacted by the effective FEMA floodplain as delineated on the associated Flood Insurance Rate Map.

Stantec developed a new onsite FLO-2D model by extracting the output hydrograph from the upstream LOMR FLO-2D data base from the JE Fuller study. See Figure 10, FLO-2D Excerpt. Starting with the existing onsite berm, the model flow depths were 0.5 feet as surface sheet flow and 2 to 4 feet depths within the wash areas. However, a portion of the surface runoff flowed through the existing berm/ground elevations. See Figures 11 through 14, FLO-2D Results (Stantec). With the proposed design of the preferred alternative, the improvements include a consistent 3-foot high earthen berm with rock riprap slope protection (3:1), and a 3-foot concrete cut-off wall on the water side of the westernmost Section 404 corridor. The berm will be constructed 5 to 10 feet offset from the existing channel bank. See Figure 15a, Preferred Berm Alignment.

6.0 REFERENCES

Army Corps of Engineers PJD 2011

Ryan Airfield Airport-Wide Basin Study Update (Drainage Master Plan), Stantec, 2006

Conditional Letter of Map Revision, Ryan Airfield and Tucson International Airport, Stantec, 2009

Initial Drainage Report, SR 86: Sandario Road to Kinney Road, J2 Engineering and Environmental Design, 2007

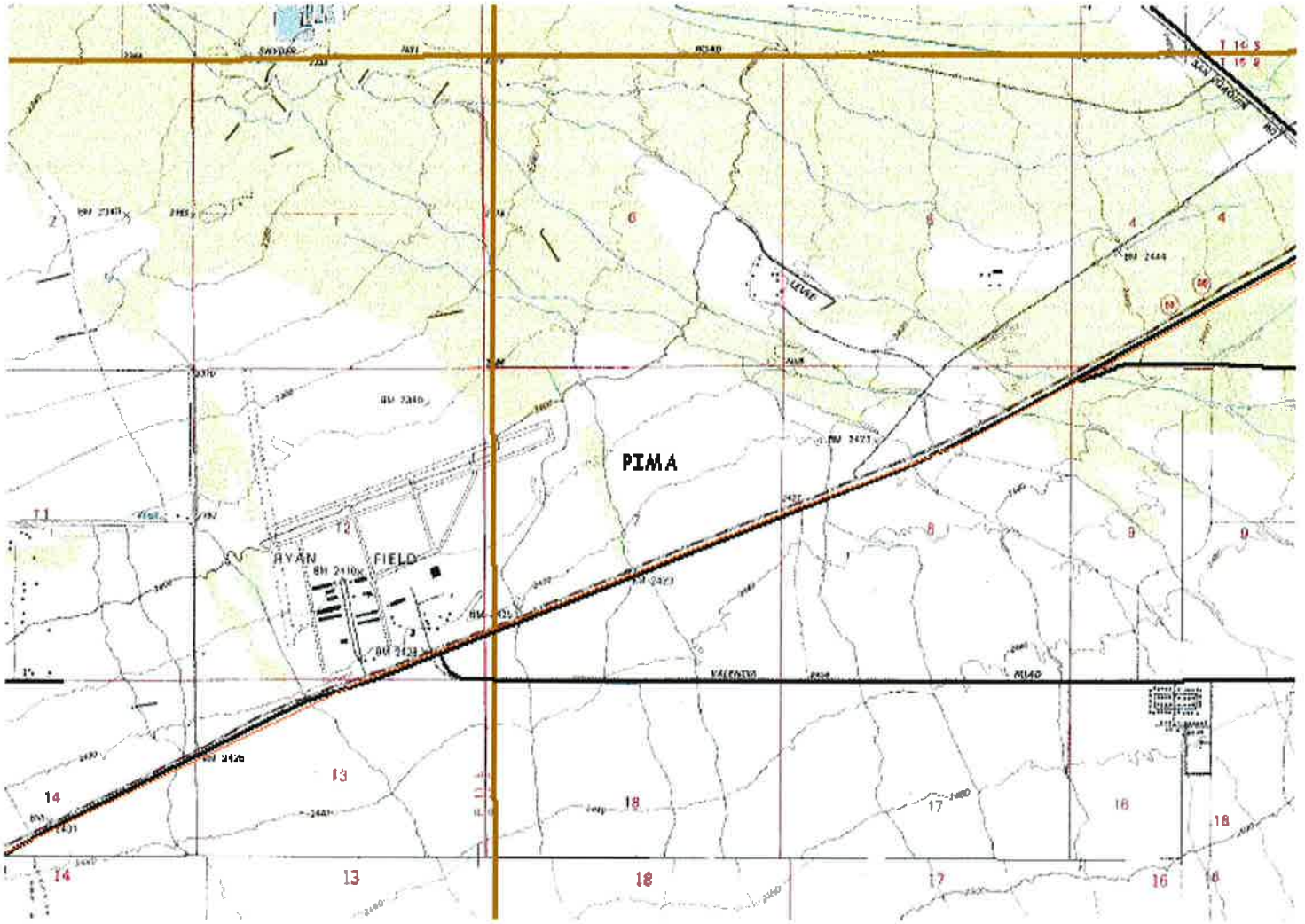
ADOT Roadway Plans, SR 86: Valencia Road to Kinney Road, 2015

FLO-2D Hydrology Analysis for Arizona State Route 86: Valencia Road to Kinney Road, Pima County, Arizona, JE Fuller, 2012

Letter of Map Revision for "Pomegranate Farms", CMG Engineering, 2016

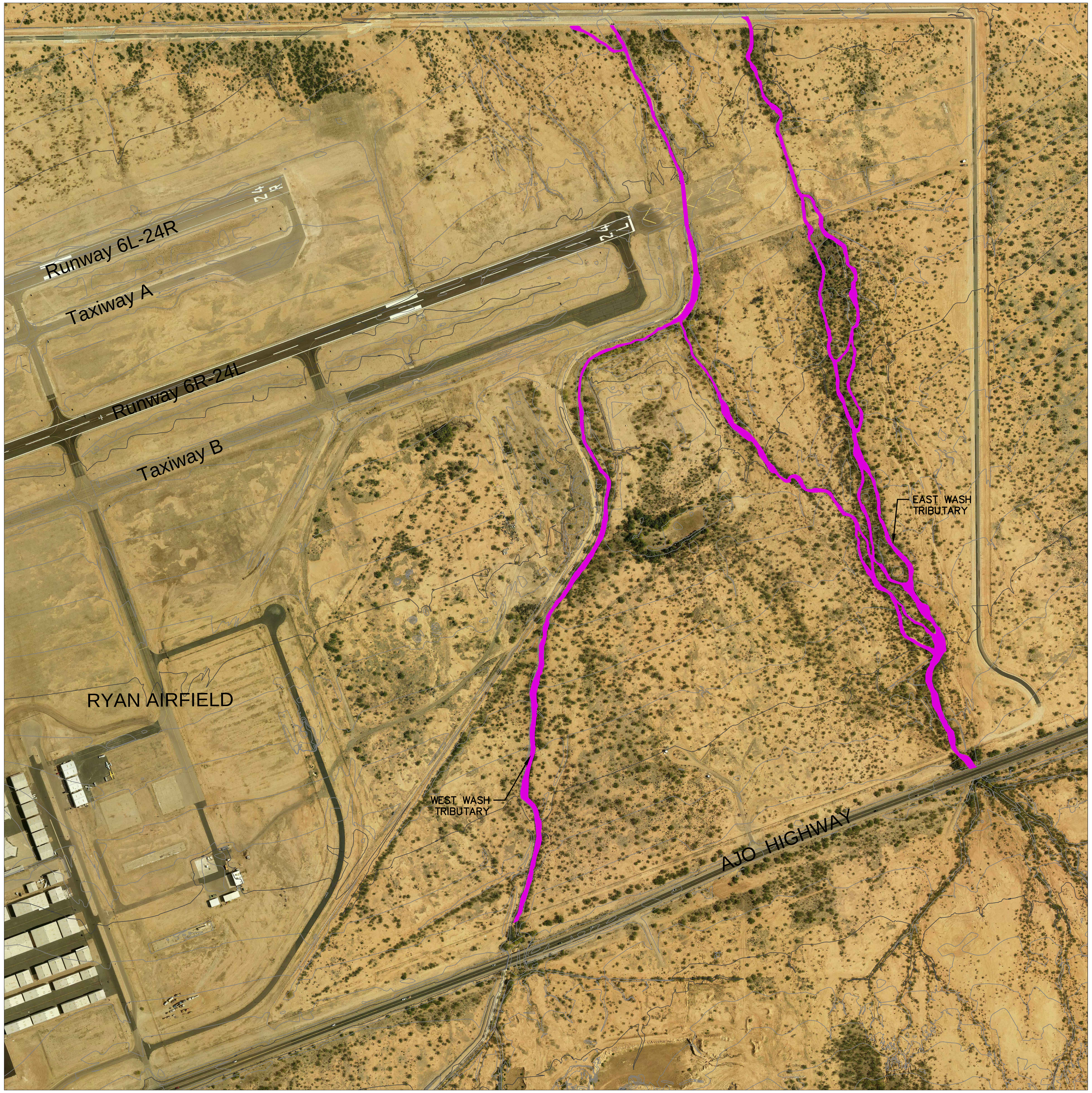
Letter of Map Revision for "Unnamed Parcels", JE Fuller, 2016

Location Map - Ryan Air Field, Tucson, AZ



USGS QUADRANGLE MAP

FIG: 1



LEGEND

404 JD's

2011 ACOE 404 Jurisdictional Limits

Stantec

Client/Project
RYAN AIRFIELD

RYAN AIRFIELD CONCEPT DRAINAGE IMPROVEMENTS
LEVEE ALIGNMENT
City, State/Prov
404 DRAINAGE EXHIBIT

Permit-Seal

Revision | By | Appd. | YY.MM.DD
Issued | By | Appd. | YY.MM.DD

Project Number: 181304016
File Name: drawing.dwg

RLM	JSW	RB	11-29-2016
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. dwg no

Revision Sheet

FIG: 1a 1 of 1

Conceptual Drainage Improvements
Drainage Master Plan 2006

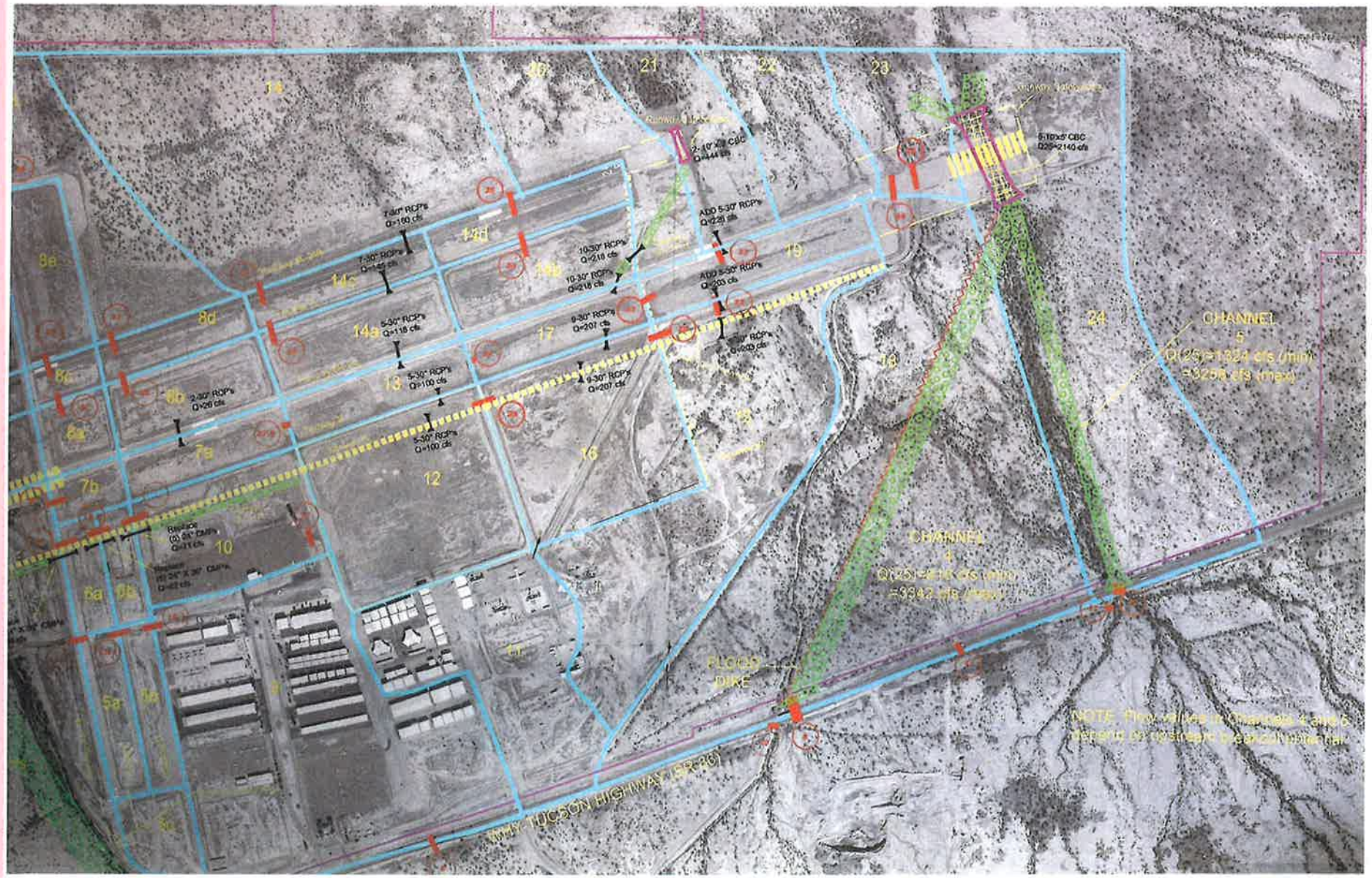
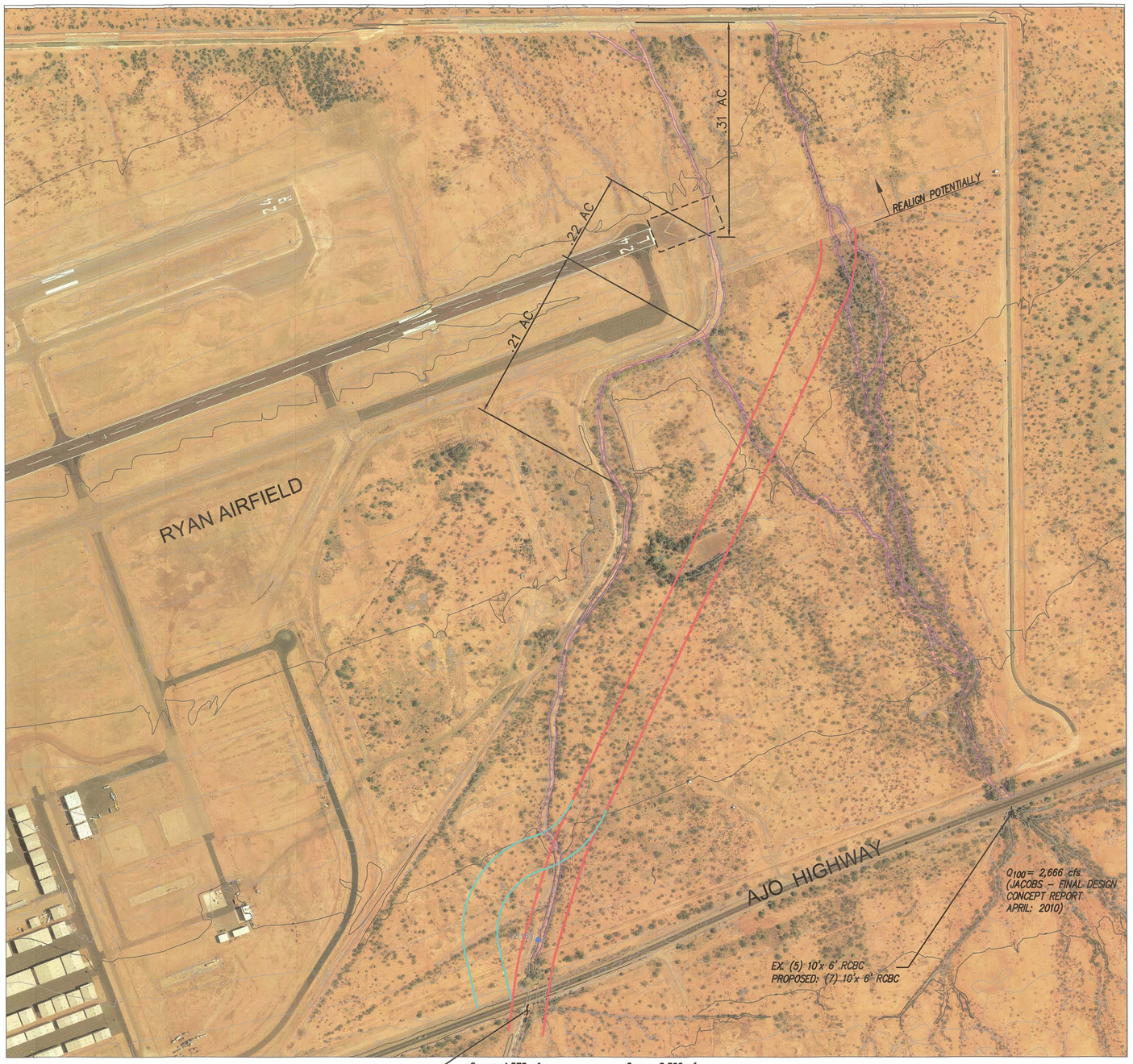
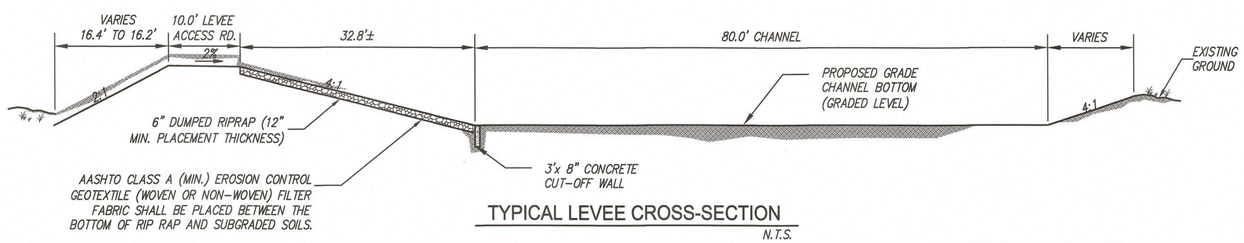


FIG: 2

Effective FEMA FIRM, 2011

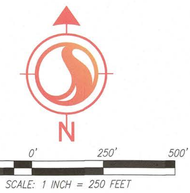
FIG: 3





TYPICAL LEVEE CROSS-SECTION

N.T.S.



LEGEND

- 404 JD's
- 2009 STANTEC CLOMR
- ALTERNATIVE 1 ALIGNMENT
- APPROCIMATE SAFTY ZONE LINE

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LEVEE ALIGNMENT
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DRAINAGE EXHIBIT

Permit-Seal

Project Number: 181304016
File Name: drawing.dwg

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RLM	JSW	RB	11-29-2016

Drawing No. dwg no
Revision Sheet
FIG: 4 1 of 1

ORIGINAL SHEET - ARCH D

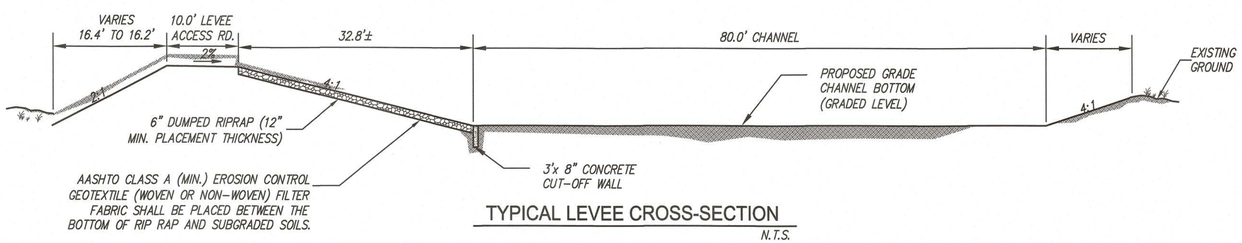
N

250' 0' 250' 500'

SCALE: 1 INCH = 250 FEET

LEGEND

- 404 JD's
- ALTERNATIVE 2 ALIGNMENT
- APPROCIMATE SAFTY ZONE LINE



TYPICAL LEVEE CROSS-SECTION

N.T.S.

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RYAN AIRFIELD CONCEPT DRAINAGE IMPROVEMENTS
LEVEE ALIGNMENT

City, State/Prov

DRAINAGE EXHIBIT

Permit-Seal

Project Number: 181304016
File Name: drawing.dwg

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RLM	JSW	RB	11-29-2016

Drawing No. dwg no

Revision Sheet

FIG: 5 1 of 1

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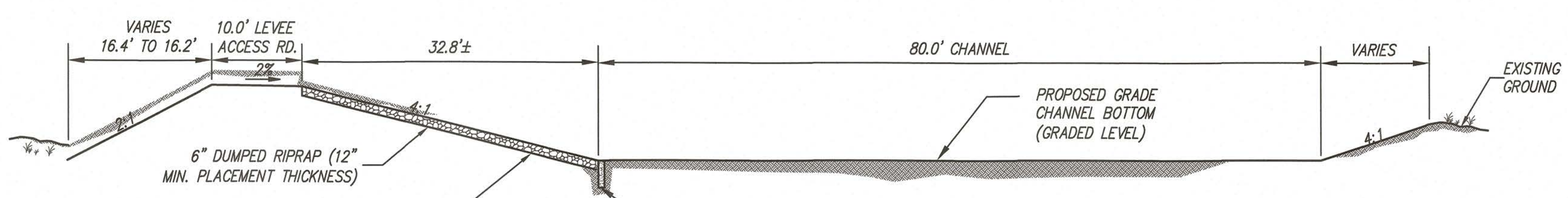
2017/04/12 2:25 PM By: Morris, Robert

ORIGINAL SHEET - ARCH D

EX. (7) 10'x 5' RCBC
PROPOSED: (14) 10'x 5' RCBC

Q_{100}= 4,578 cfs
(JE FULLER / HYDROLOGY & GEOMORPHOLOGY, INC.
FEB: 13, 2007)

Q_{100}= 5,302 cfs
(JACOBS - FINAL DESIGN
CONCEPT REPORT
APRIL: 2010)



TYPICAL LEVEE CROSS-SECTION

N.T.S.

SCALE: 1 INCH = 250 FEET

LEGEND

404 JD's

ALTERNATIVE 3 ALIGNMENT

APPROCIMATE SAFTY ZONE LINE

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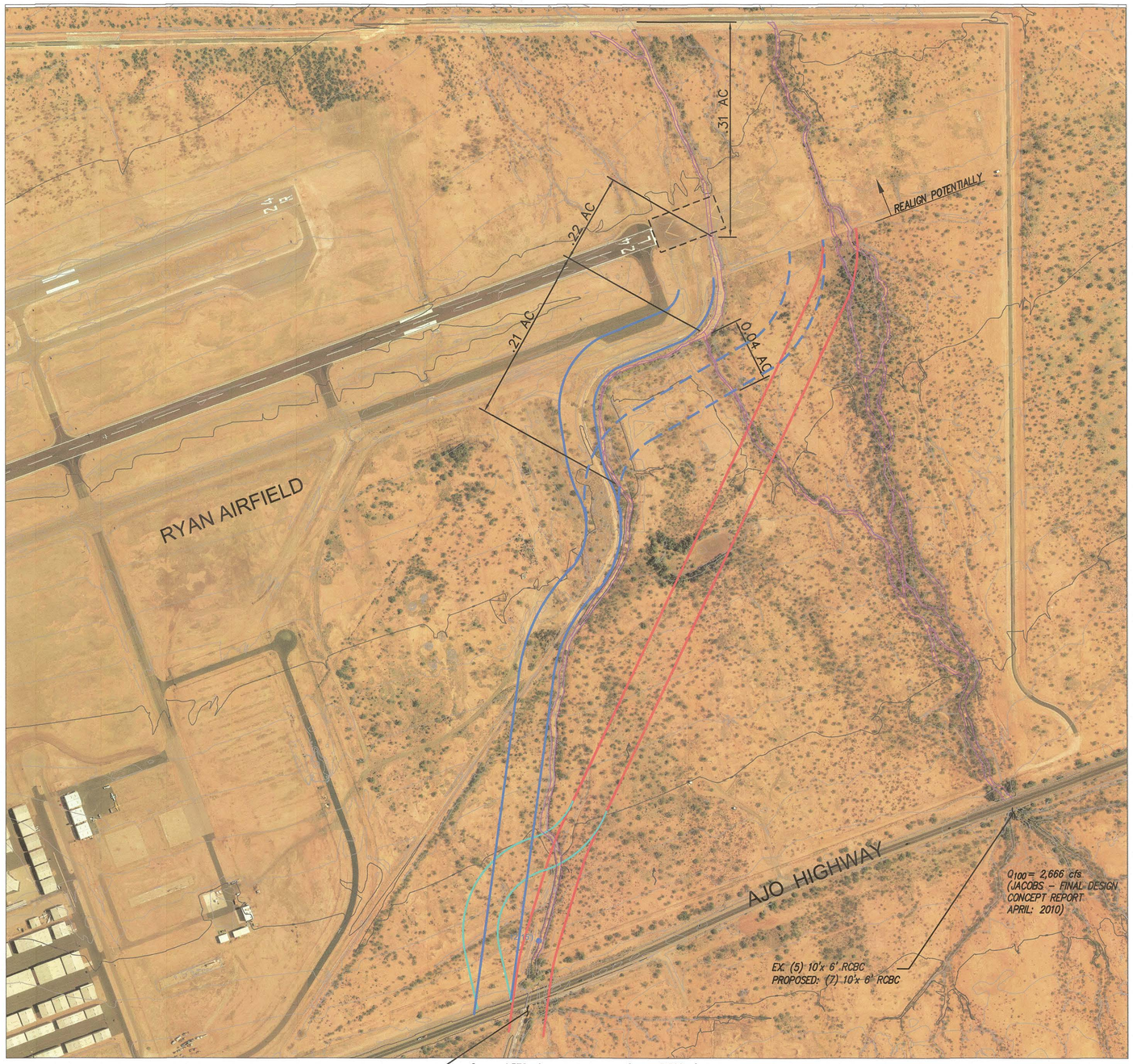
LEVEE ALIGNMENT
City, State/Prov
DRANAGE EXHIBIT

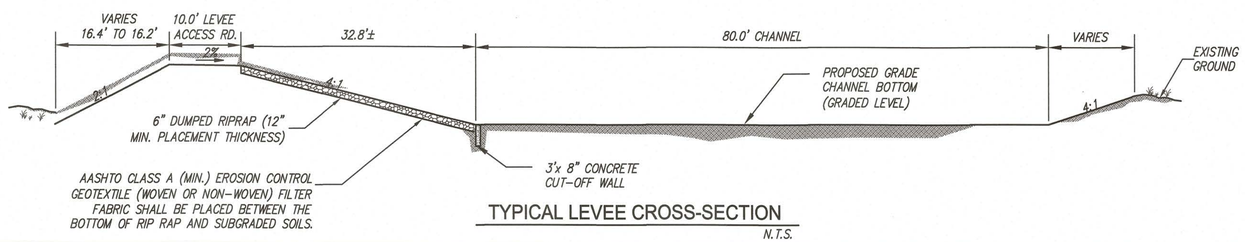
Permit-Seal

Project Number: 181304016
File Name: drawing.dwg

RLM	JSW	RB	11-29-2016
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. dwg no
Revision Sheet
FIG: 6 1 of 1





TYPICAL LEVEE CROSS-SECTION

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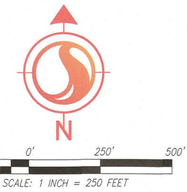

LEGEND

- 404 JD's
- 2009 STANTEC CLOMR
- ALTERNATIVE 1 ALIGNMENT
- ALTERNATIVE 2 ALIGNMENT
- ALTERNATIVE 3 ALIGNMENT
- APPROCIMATE SAFTY ZONE LINE

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Client/Project
RYAN AIRFIELD

RYAN AIRFIELD CONCEPT DRAINAGE IMPROVEMENTS
LEVEE ALIGNMENT

City, State/Prov

DRAINAGE EXHIBIT

Permit-Seal

Project Number: 181304016
File Name: drawing.dwg

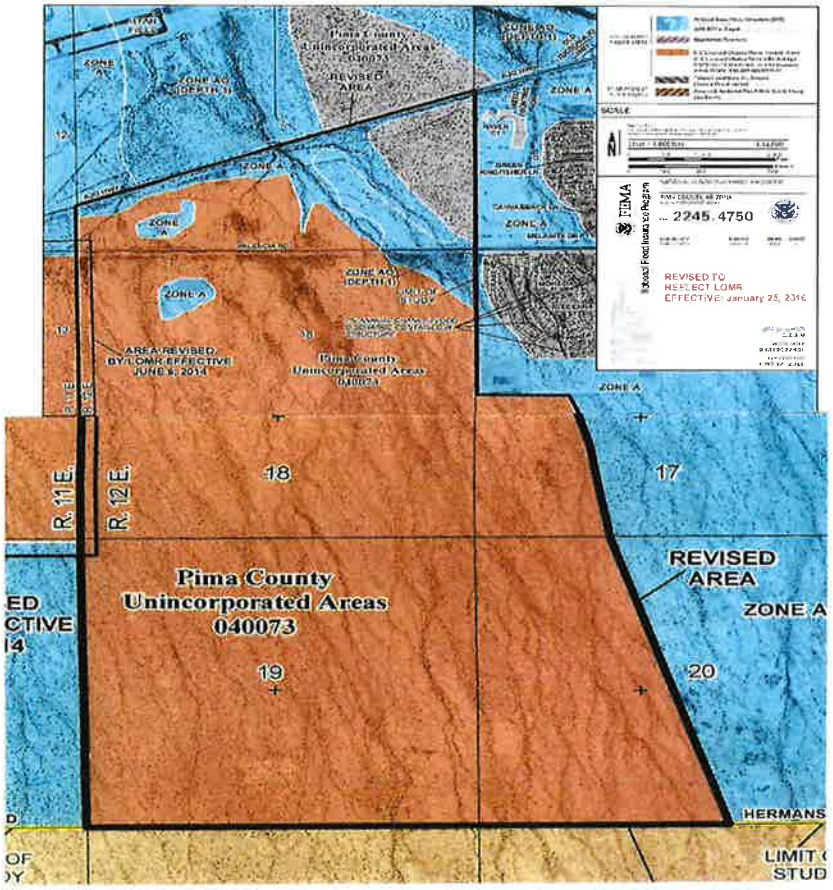
Dwn.	Chkd.	Dsgn.	YY.MM.DD
RLM	JSW	RB	11-29-2016

Drawing No. dwg no

Revision Sheet

FIG: 7

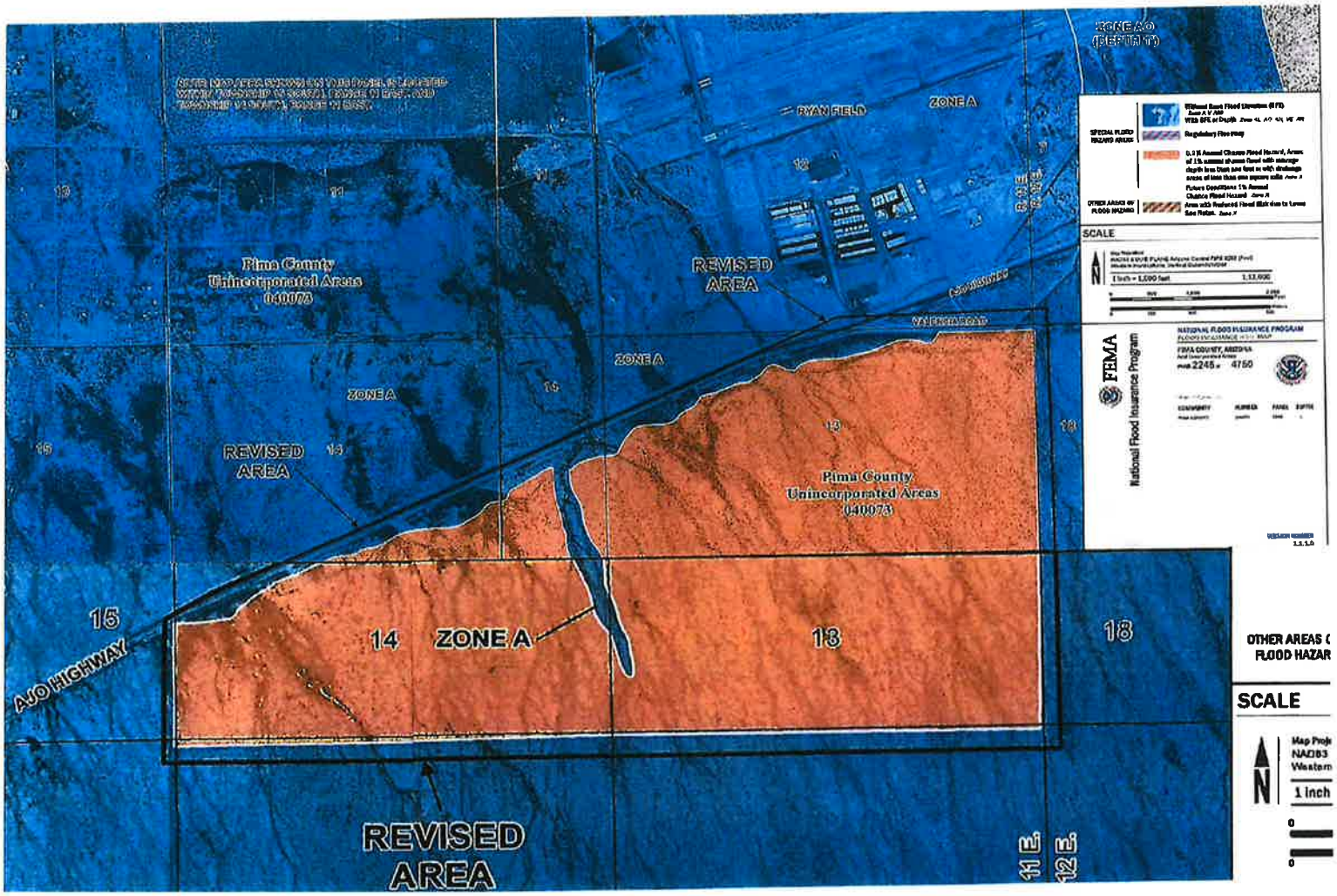
LOMR* Upstream of Ajo Highway
"Pomegranate Farms"



*CMG Engineering

FIG: 8

LOMR* Upstream of Ajo Highway
"Unnamed parcels"



*JE Fuller

FIG: 9

FLO-2D Excerpt

FIGURE 3 - SHEET 1 - SR86 FLO-2D DISCHARGES

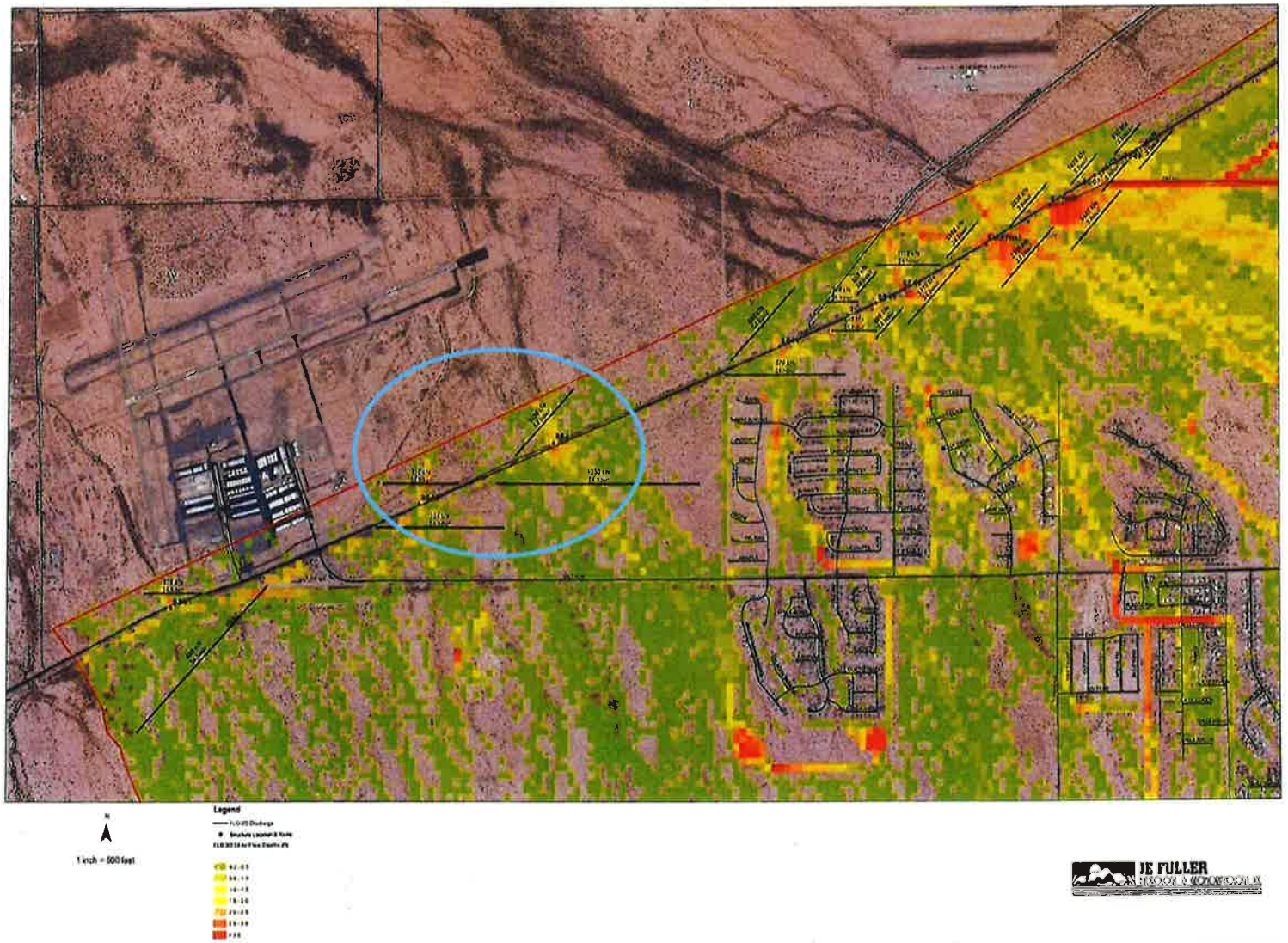


FIG: 10

FLO-2D
Flood Depth (Existing)

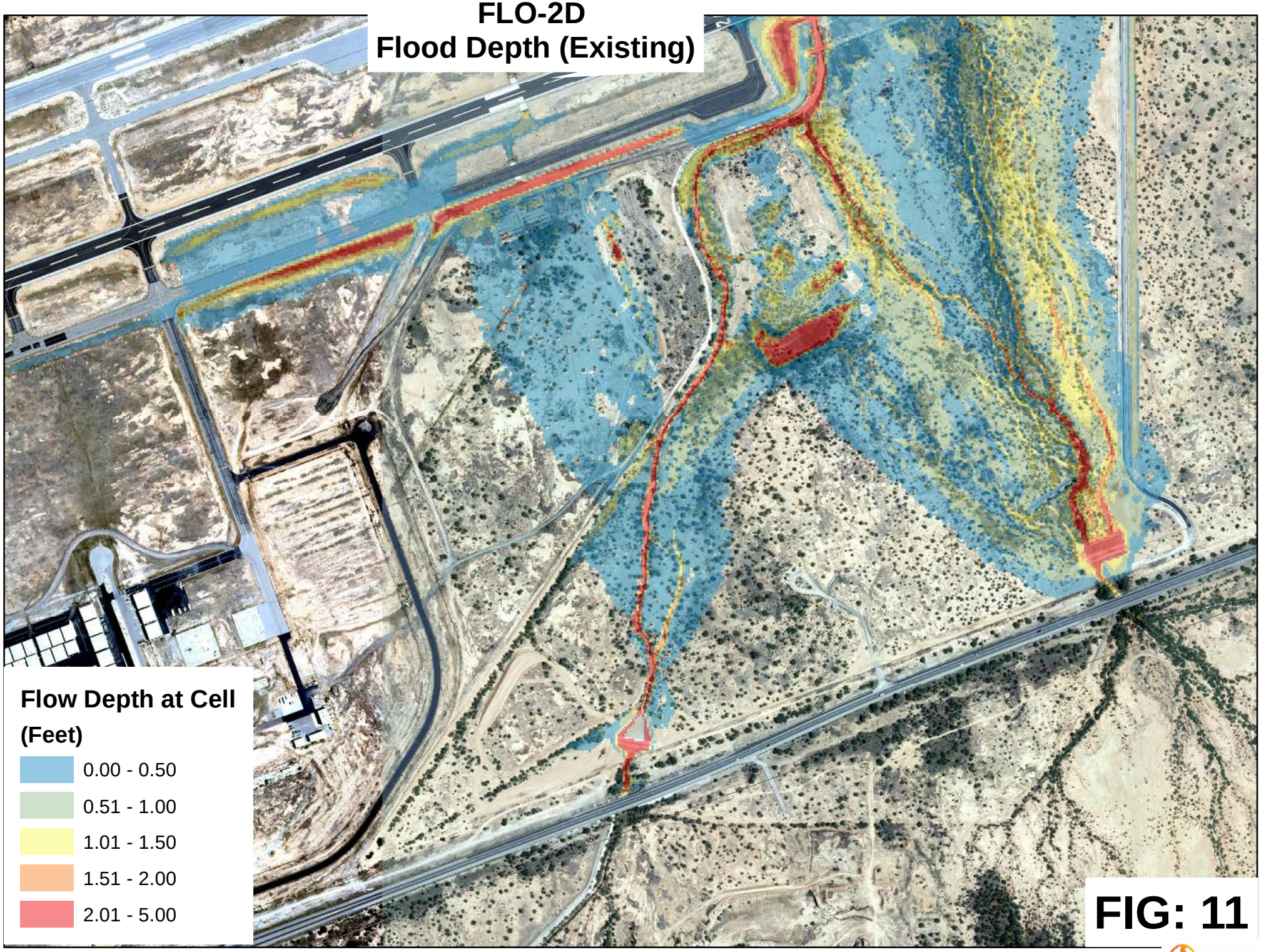


FIG: 11

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FLO-2D
Flood Depth (Proposed)

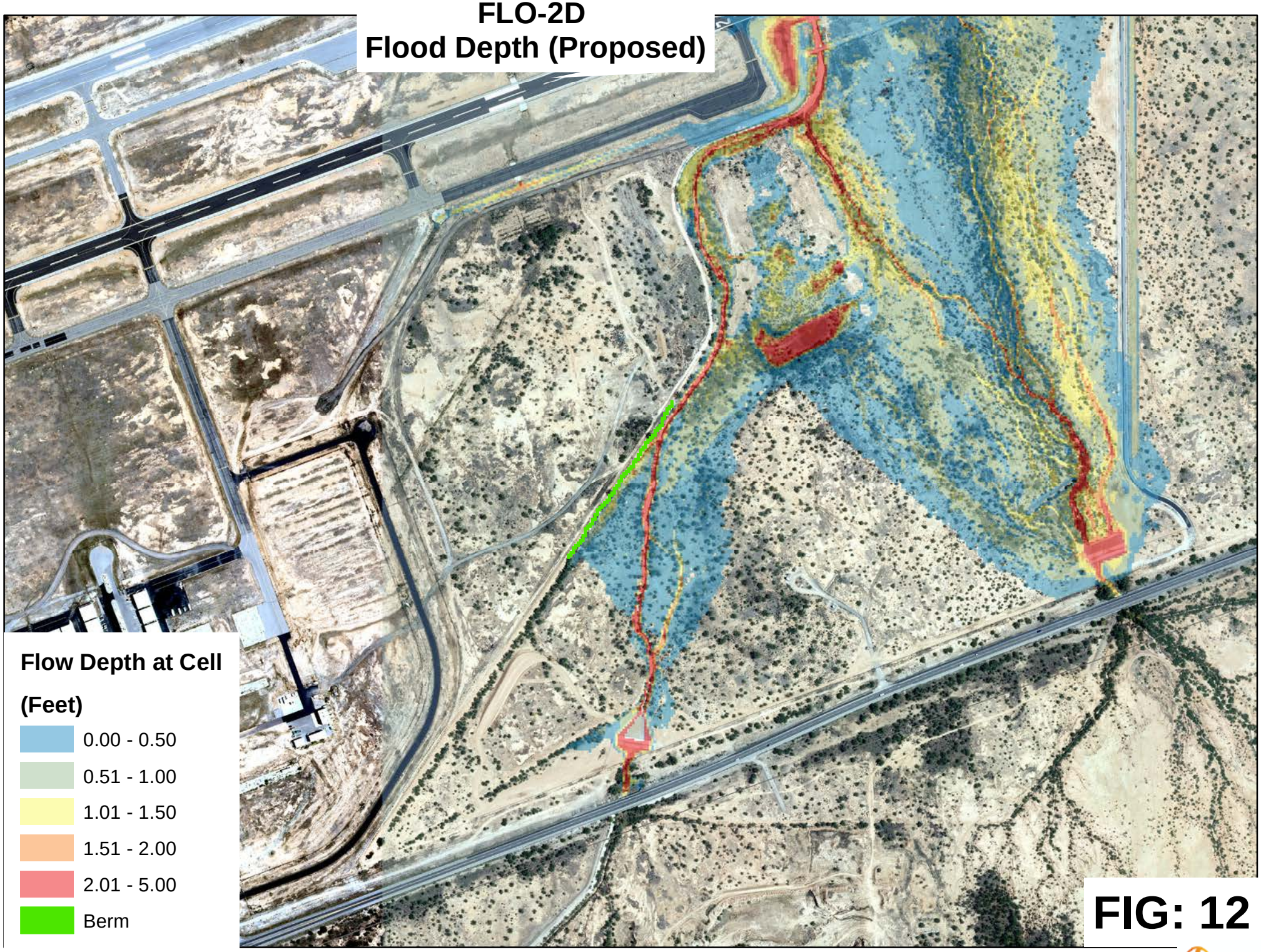

FIG: 12

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FLO-2D
Velocity (Existing)

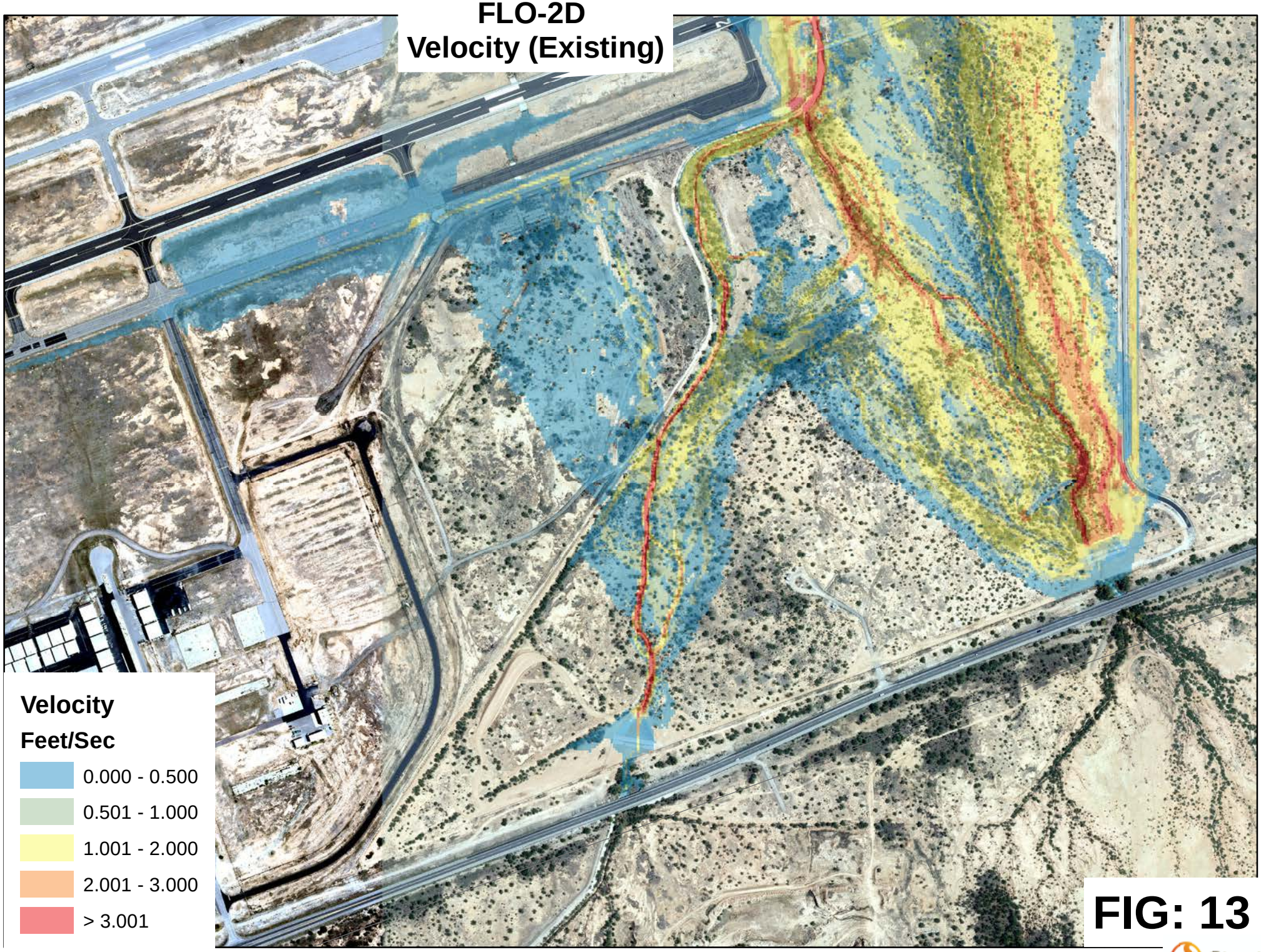

FIG: 13

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FLO-2D
Velocity (Proposed)

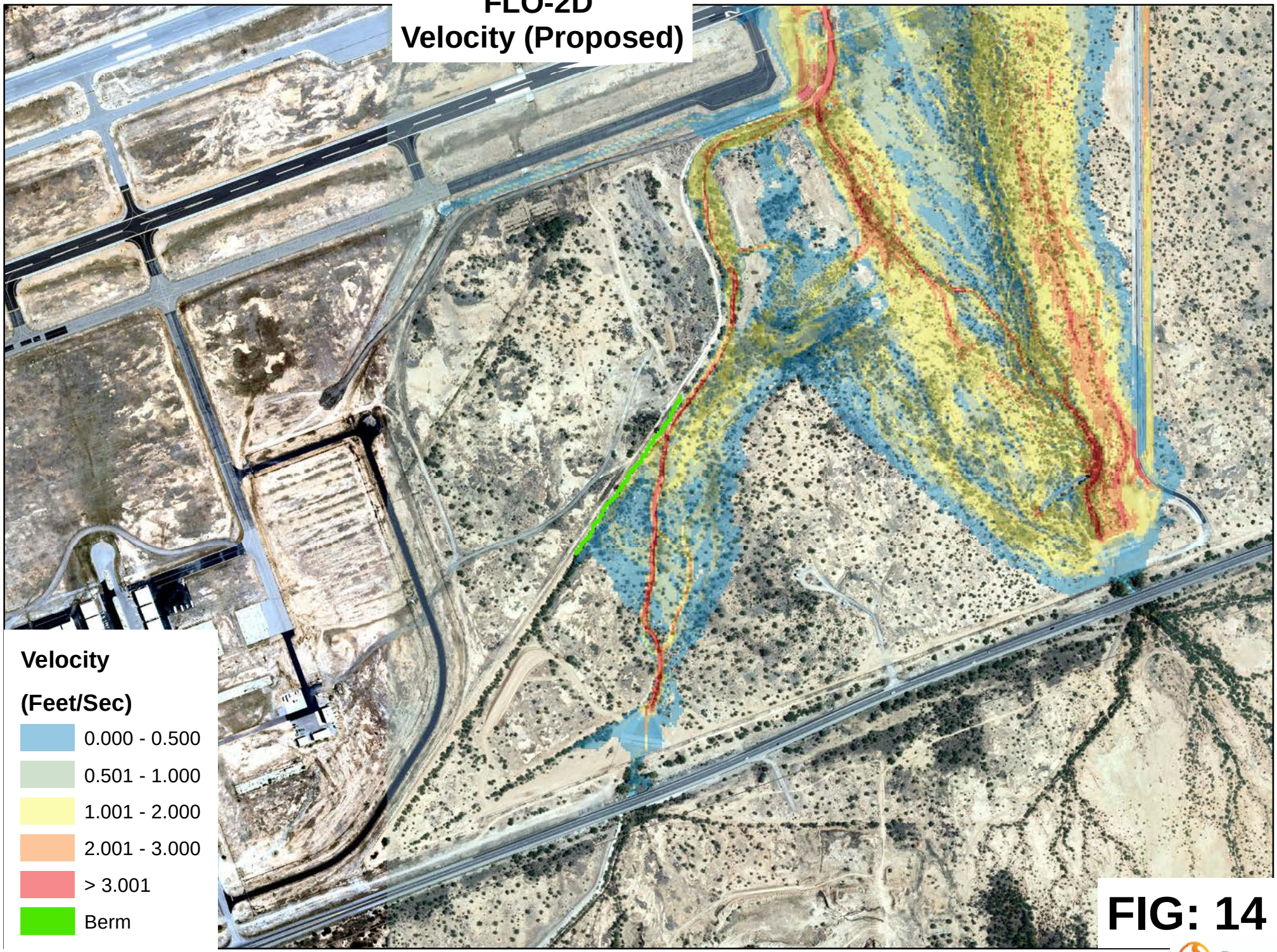

FIG: 14

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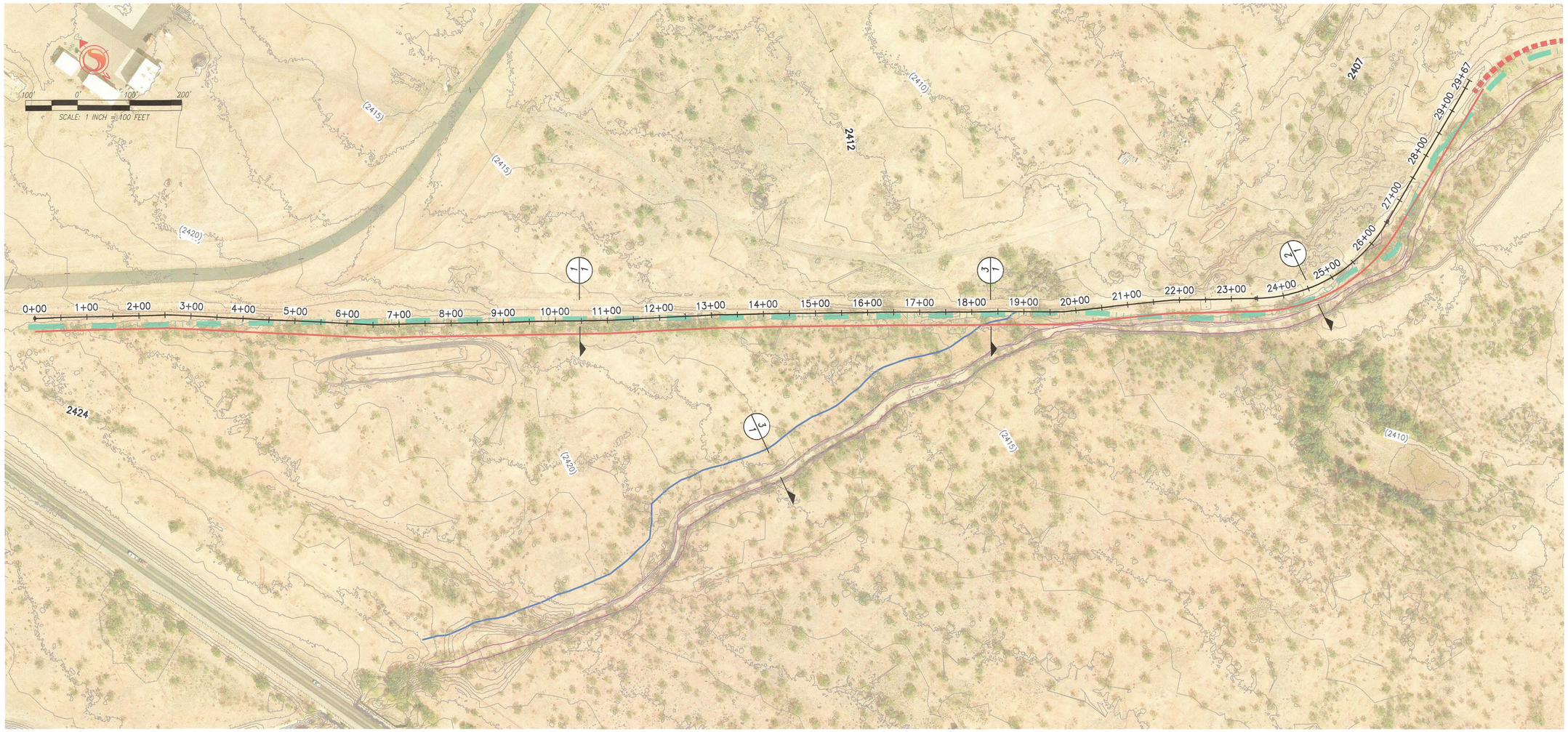

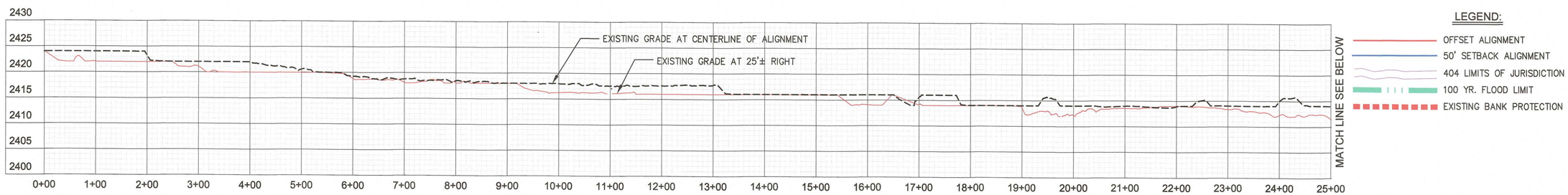

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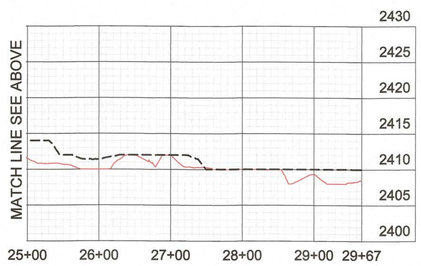

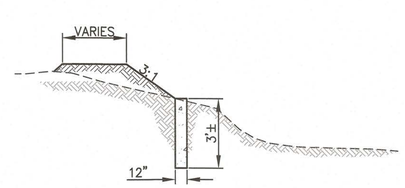

1/1 BANK IMPROVEMENT SECTION
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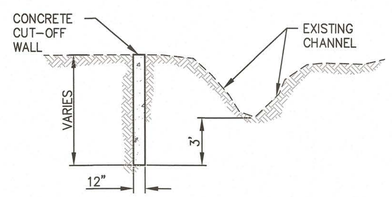
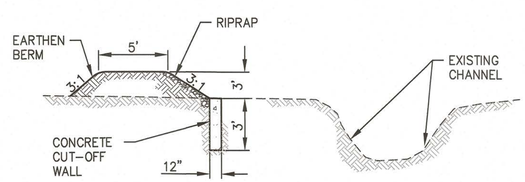


2/1 CUT-OFF WALL SECTION
N.T.S.



3/1 BERM SECTION / ALT. SECTION
N.T.S.

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TUCSON AIRPORT AUTHORITY
Ryan Airfield EA
CONCEPTUAL DRAINAGE IMPROVEMENTS
Pima County, Arizona
PLAN AND PROFILE

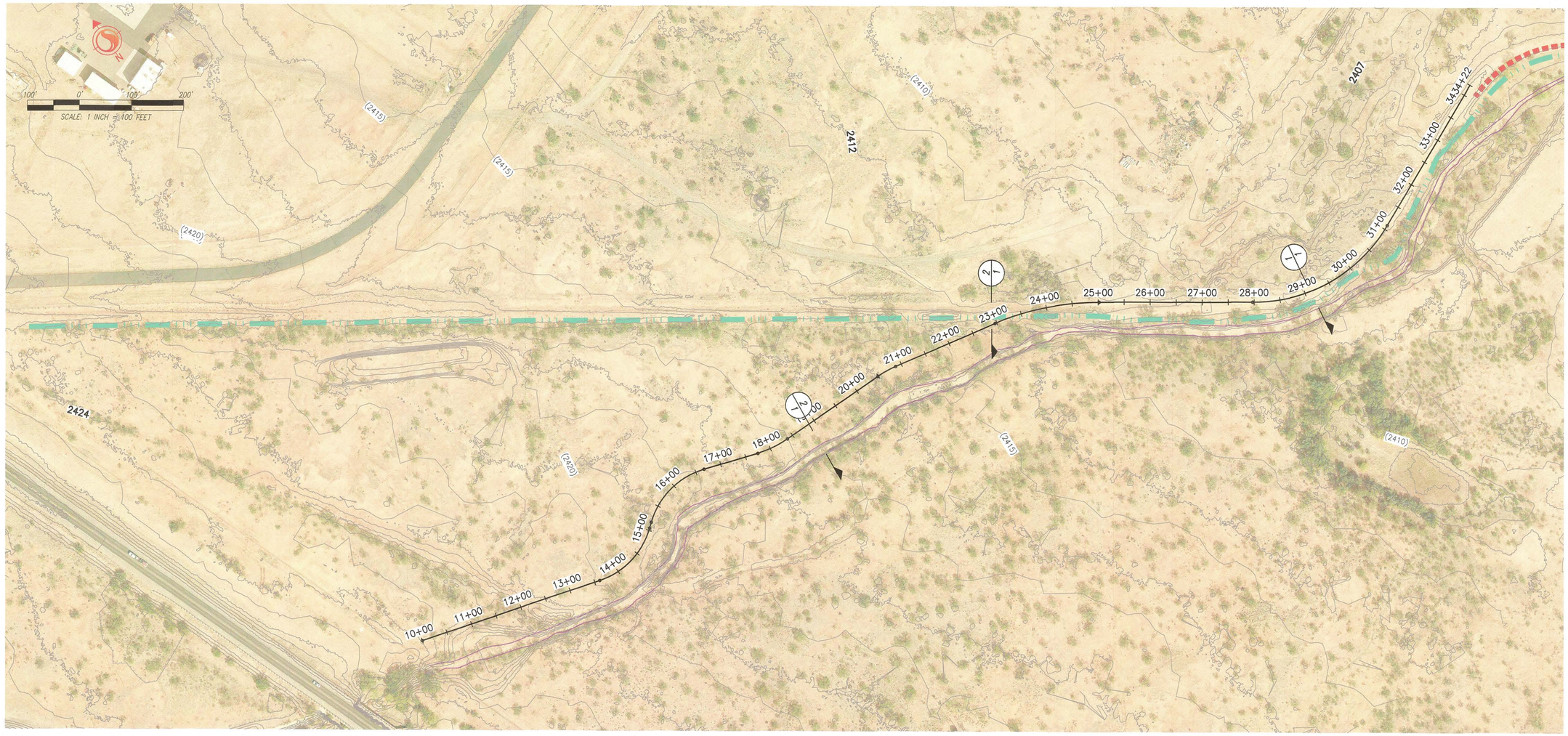
Permit-Seal

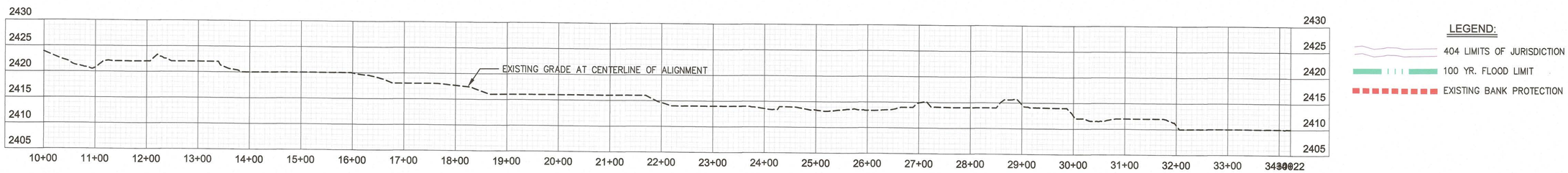
PRELIMINARY

Project Number: 1813040016
File Name: drawing.dwg

Dwn.	Chkd.	Dsgn.	YY.MM.DD
RLM	JSW	RB	04.27.17

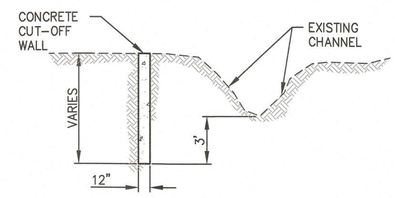
Drawing No. dwg no
Revision Sheet
FIG: 15 1 of 1



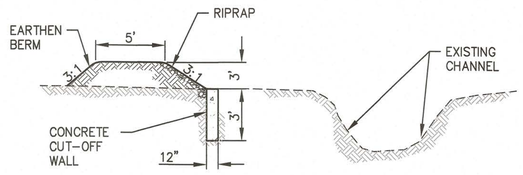


LEGEND:

- 404 LIMITS OF JURISDICTION
- 100 YR. FLOOD LIMIT
- EXISTING BANK PROTECTION



1/1 CUT-OFF WALL SECTION
N.T.S.



2/1 BERM SECTION / ALT. SECTION
N.T.S.

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Client/Project
TUCSON AIRPORT AUTHORITY
Ryan Airfield EA
CONCEPTUAL DRAINAGE IMPROVEMENTS
Pima County, Arizona
PLAN AND PROFILE

Permit-Seal

PRELIMINARY

Project Number: 1813040016
File Name: drawing.dwg

Dwn.	Chkd.	Dsgn.	YY.MM.DD
RLM	JSW	RB	04.27.17

Drawing No. dwg no
Revision Sheet
FIG: 15a 1 of 1

Appendix C – USACE Coordination

Prepared by Army Corps of Engineers, 2017

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, U.S. ARMY CORPS OF ENGINEERS
3636 N. CENTRAL AVE, SUITE 900
PHOENIX, AZ 85012-1939

September 13, 2017

SUBJECT: Determination of Need for Department of the Army Permit

Ralph Redman
C&S Engineers, Inc.
2020 Camino del Rio North Suite 100
San Diego, California 92108

Dear Mr. Redman:

I am responding to your request (File No. SPL-2017-00598-MWL) dated August 10, 2017, for clarification whether a Department of the Army Permit is required for the Ryan Airfield Drainage Improvements project (32.1394°N, -111.1731°W) located, Pima County, Arizona.

The Corps' evaluation process for determining if you need a permit is based on whether or not the proposed project is located within or contains a water of the United States, and whether or not the proposed project includes an activity potentially regulated under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act. If both conditions are met, a permit would be required.

Based on the preliminary jurisdictional determination issued in December 2011, it appears the Ryan Airfield Drainage Improvements project site contains waters of the United States pursuant to 33 CFR Part 325.9. However, I have determined the work, as currently proposed, would not involve a discharge of dredged or fill material and therefore, would not be regulated under Section 404 of the Clean Water Act. Notwithstanding this determination, your proposed project may be regulated under other Federal, State, and local laws.

If you have any questions, please contact Michael Langley at (602) 230-6953 or via e-mail at Michael.W.Langley@usace.army.mil. Thank you for participating in the Regulatory Program. Please help me to evaluate and improve the regulatory experience for others by completing the customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,

Sallie Diebolt
Chief, Arizona Branch
Regulatory Division

Appendix D – FEMA Floodplain Maps

Prepared by Federal Emergency Management Association, 2011

Effective FEMA FIRM, 2011

FIG: 3

Appendix E – Biological Evaluation

Prepared by SWCA, Inc., 2017

SWCA®
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

Biological Evaluation of the Ryan Airfield Drainage Improvements Phase I Project in Tucson, Pima County, Arizona

Prepared for

Tucson Airport Authority

Prepared by

SWCA Environmental Consultants

August 2017

BIOLOGICAL EVALUATION OF THE RYAN AIRFIELD DRAINAGE IMPROVEMENTS PHASE I PROJECT IN TUCSON, PIMA COUNTY, ARIZONA

Prepared for

Tucson Airport Authority
7005 South Plumer Avenue
Tucson, Arizona 85756
Attn: Eric Roudebush

Prepared by

Russell Waldron

SWCA Environmental Consultants
343 West Franklin Street
Tucson, Arizona 85701
(520) 325-9194
www.swca.com

SWCA Project No. 28352

August 2017

EXECUTIVE SUMMARY

This biological evaluation (BE) has been prepared as part of an effort to address the Endangered Species Act of 1973 (ESA) for a proposed drainage improvement project located at Ryan Airfield in Section 7, Township 15 South, Range 12 East, and Section 12, Township 15 South, Range 11 East. This project's biological evaluation covers an approximate 31.7-acre, largely undisturbed parcel located on the eastern portion of Ryan Airfield, north of Ajo Highway (State Route 86). The objectives of this BE are to 1) describe vegetation communities in the project area; 2) evaluate habitat suitability for both federally listed and special-status species; and 3) assess the potential for the project to impact federally listed species.

Twenty-two federally listed species are addressed in this BE, all of which are listed by the U.S. Fish and Wildlife Service (USFWS) as threatened, endangered, or proposed endangered and are therefore protected under the authority of the ESA. The proposed project will have no effect on any of the 22 federally listed species. However, the lead permitting agency has the authority and final decision regarding what effect this project would have on any federally listed species and whether to require species-specific surveys for any protected species.

1.0 INTRODUCTION

SWCA Environmental Consultants (SWCA) was subcontracted by C&S Engineers, Inc., to complete a biological evaluation for the Tucson Airport Authority Ryan Airfield Drainage Improvements Phase I Project (the project) area, located in Pima County, Arizona (Figure 1). The project area is approximately 31.7 acres and located in Section 7, Township 15 South, Range 12 East and Section 12, Township 15 South, Range 11 East, Gila and Salt River Baseline and Meridian (Figure 2). This biological evaluation (BE) covers an area located on the east-central portion of Ryan Airfield property, north of Ajo Highway, and northeast of the Ajo Highway/Valencia Road intersection. The proposed project is for constructing drainage improvements (i.e., construction of a berm) within a portion of the airport property. The new berm will replace an existing earthen berm that does not meet Federal Emergency Management Agency standards. The purpose of this BE is to address the Endangered Species Act of 1973, as amended (ESA) (16 United States Code [USC] 1531 et seq.).

The scope of work for this biological evaluation included

- review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website for species lists for Pima County and the project area;
- review of the Arizona Game and Fish Department (AGFD) online occurrence records for special-status species near the project area;
- a field reconnaissance of the property;
- a species-specific survey for the Pima pineapple cactus (PPC) (*Coryphantha scheeri* var. *robustispina*) in the project area following approved protocol; and
- evaluation of the potential for the species listed in this report to occur in the project area.

2.0 METHODS

Qualified SWCA biologists conducted a field reconnaissance of the project area on August 4, 2017. A U.S. Geological Survey 7.5-minute topographic map (Brown Mountain, Arizona) and maps provided by C&S Engineers, Inc., were used for general orientation and to locate the project boundaries. The field reconnaissance consisted of a pedestrian survey of the project area to evaluate vegetation and landscape features considered important to the potential occurrence of special-status plant and animal species. Additionally, a species-specific survey for PPC was conducted using USFWS-accepted PPC survey protocol (i.e., biologists walking parallel belt transects, with each surveyor covering an area approximately 4 to 6 meters [13–20 feet] wide) (Roller 1996). Vegetation was classified to the community level according to the map "Biotic Communities of the Southwest" (Brown 1994), and plant taxonomy and nomenclature followed the standardized information presented on the PLANTS database maintained by the Natural Resources Conservation Service (2017).

2.1 Species Identification

The USFWS maintains a list of protected species and the critical habitat that is known to occur in each Arizona county. These species are currently listed or are proposed for listing as endangered or threatened under the ESA (16 USC 1531 et seq.). The list also includes candidate species proposed as threatened or endangered, species delisted from protection under the ESA, and species delisted from protection under the ESA but currently proposed for relisting. The ESA specifically prohibits the "take" of a listed species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct." Some bird species also receive legal protection under the federal Migratory Bird

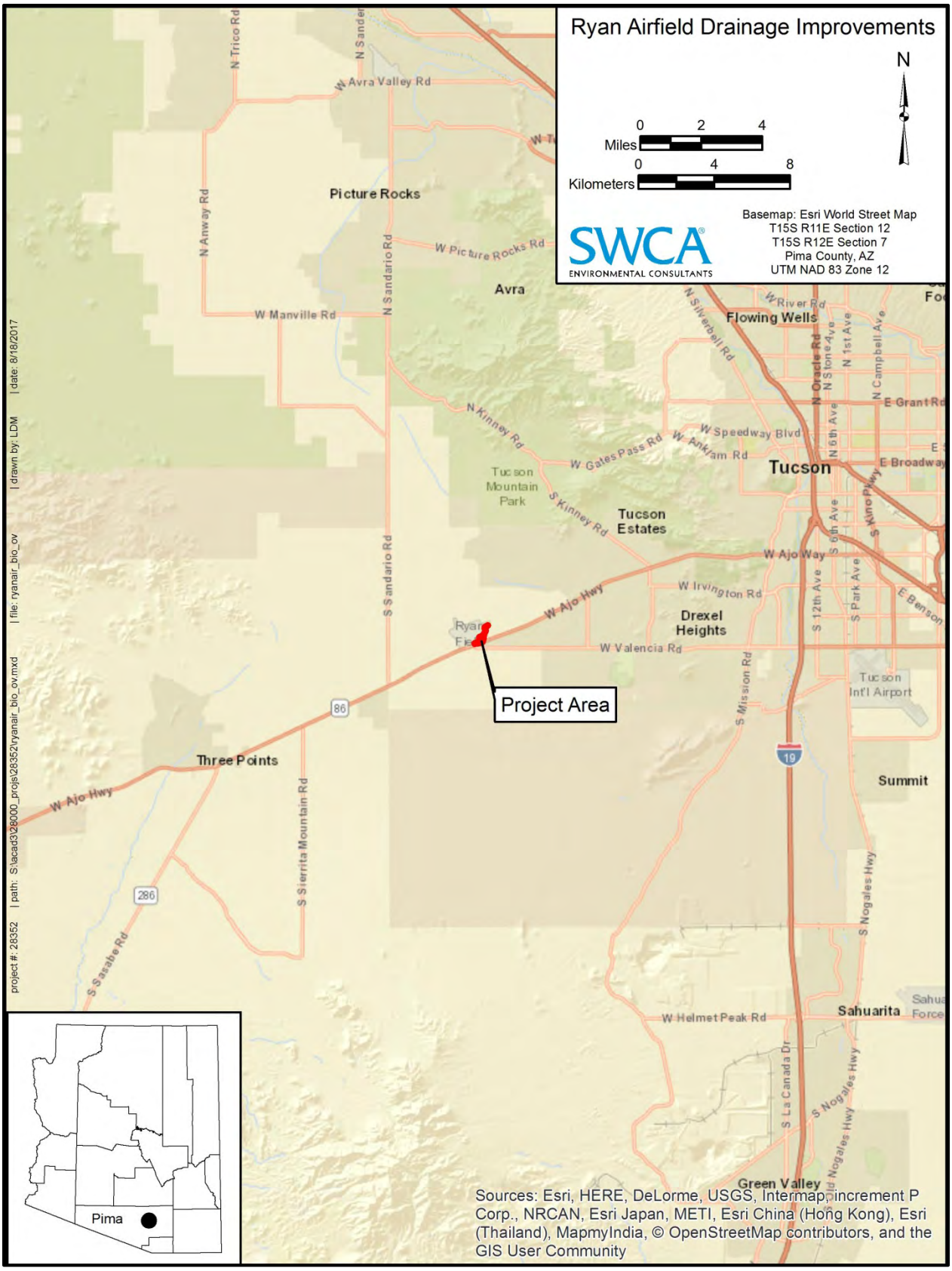


Figure 1. Project area overview.

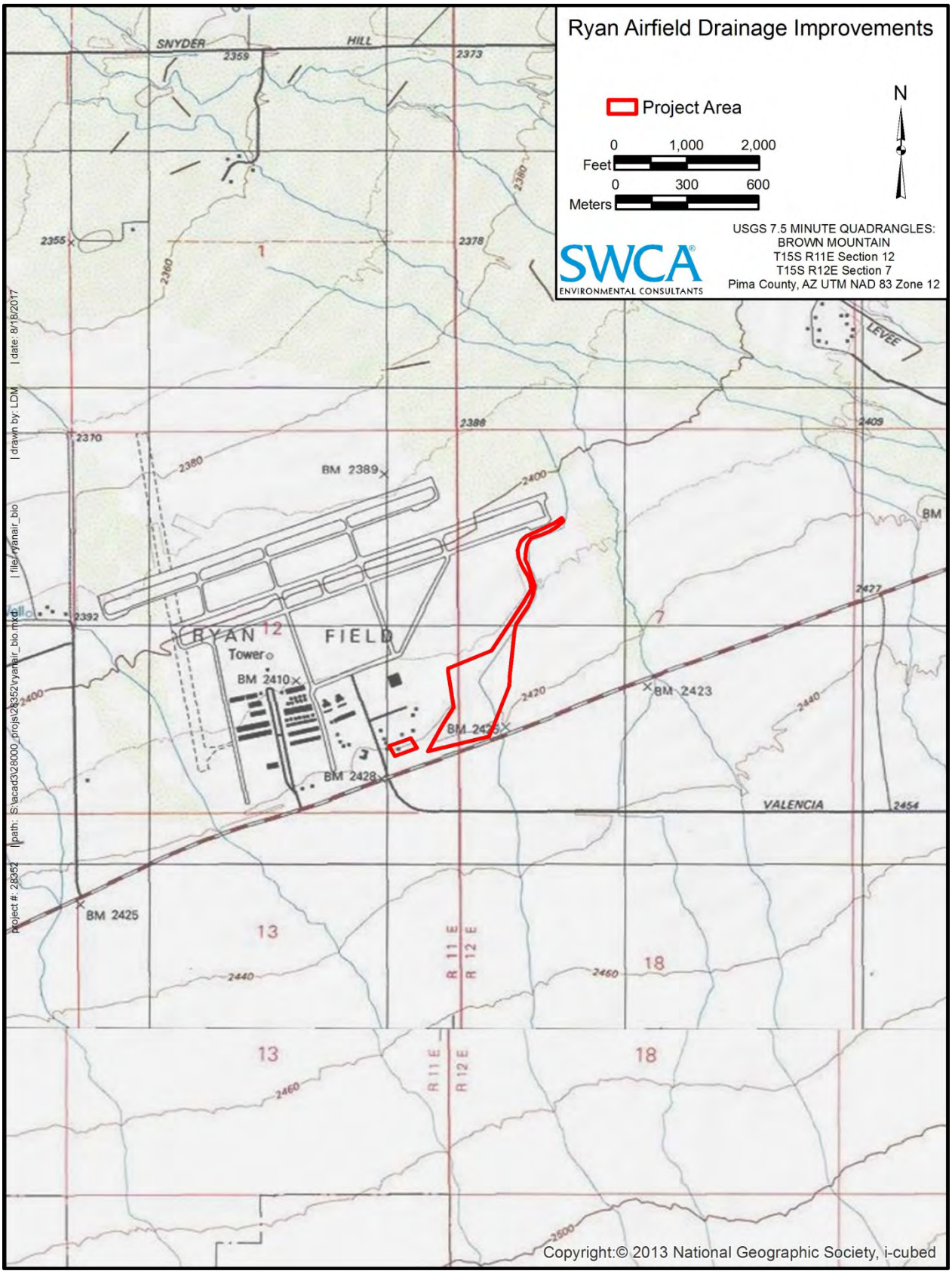


Figure 2. Project area.

Treaty Act (MBTA) (16 USC 703–712). Only species listed by the USFWS are afforded protection under the ESA. The federally listed species evaluated in this report were based on the list of endangered, threatened, and candidate species for Pima County, Arizona, as presented in the USFWS IPaC website (USFWS 2017).

A copy of the USFWS list of threatened, endangered, and candidate species for Pima County, generated through the IPaC website, is provided in Appendix A.

The AGFD maintains a statewide database, the Heritage Data Management System (HDMS), which tracks records for federally listed species and other species of special concern. SWCA accessed HDMS through the Arizona Heritage Geographic Information System (AZHGIS) online environmental review tool to determine whether any federally proposed or designated critical habitat or special-status species have been documented in or near the project area (AZHGIS 2017). The search results are included in Appendix B.

The potential for occurrence on the property of the species addressed in this biological evaluation was based on 1) documented records; 2) existing information on distribution; and 3) qualitative comparisons of the habitat requirements of each species with vegetation communities or landscape features in the project area.[1] Possible impacts to these species were evaluated based on reasonably foreseeable project-related activities (i.e., a drainage improvement project).

2.2 Species Evaluation

The potential for occurrence of each species was summarized according to the categories listed below. Because not all species are accommodated precisely by a given category (i.e., category definitions may be too restrictive), an expanded rationale for each category assignment is provided. Potential for occurrence categories are as follows:

- *Known to occur*—the species has been documented in the project area by a reliable observer.
- *May occur*—the project area is within the species' currently known range, and vegetation communities, soils, etc., resemble those known to be used by the species.
- *Unlikely to occur*—the project area is within the species' currently known range, but vegetation communities, soils, etc., do not resemble those known to be used by the species, or the project area is clearly outside the species' currently known range.

Those species listed by the USFWS were assigned to one of three categories of possible effect, following USFWS recommendations. The effects determinations recommended by USFWS are as follows:

- *May affect, is likely to adversely affect*—the proposed project is likely to adversely affect a species if 1) the species occurs or may occur in the project site; and 2) any adverse effect on listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. In the event that the overall effect of the proposed action is beneficial to the listed species but also is likely to cause some adverse effects, then the proposed action "is likely to adversely affect" the listed species.

[1] We agree with Hall et al. (1997) that habitat is organism specific and thus not synonymous with vegetation community. However, we have refined their definition to read as follows: habitat is an area in which some members of a species regularly occur continuously or seasonally. In the field, habitat is operationally defined by the presence or absence of a species. Areas that appear suitable for a species but that have not been surveyed are considered possible habitat. We avoid using the term *potential* with respect to habitat because potential is defined as 'capable of becoming but not yet in existence'; *possible*, on the other hand, is defined as 'of uncertain likelihood'. We also avoid using the terms "unoccupied habitat" or "suitable, but unoccupied habitat," which represent a contradiction in terms.

- *May affect, is not likely to adversely affect*—the project is not likely to adversely affect a species if 1) the species may occur but its presence has not been documented and/or surveys following approved protocol have been conducted with negative results; and/or 2) project activity effects on a listed species are expected to be discountable, insignificant, or completely beneficial.

  Beneficial effects are contemporaneous positive effects without any adverse effects on the species. **Insignificant effects** relate to the size of the impact and should never reach the scale where take occurs. **Discountable effects** are those extremely unlikely to occur. Based on best judgment, a person would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.

- *No effect*—the project will have no effect on a species if 1) it has no likelihood of effect on a listed species or its designated critical habitat (including effects that may be beneficial, insignificant, or discountable); or 2) the species' habitat does not occur in the project site.

Because species not listed as threatened or endangered are not protected under the authority of the ESA, impact determinations for these species do not follow the above USFWS recommendations. Instead, the impact determinations for any species listed as candidate or proposed threatened or proposed endangered and not protected under the ESA are as follows:

- *No impact*—the project would have no impact on a species if 1) the species is considered unlikely to occur (range, vegetation, etc., are inappropriate); and 2) the species or its sign was not observed during surveys of the project area.
- *Beneficial impact*—the project is likely to benefit the species, whether it is currently present or not, by creating or enhancing habitat elements known to be used by the species.
- *May impact individuals but is not likely to result in a trend toward federal listing or loss of viability*—the project is not likely to adversely impact a species if 1) the species may occur but its presence has not been documented; and 2) project activities would not result in disturbance to areas or habitat elements known to be used by the species.
- *May impact individuals and is likely to result in a trend toward federal listing or loss of viability*—the project is likely to adversely impact a species if 1) the species is known to occur in the project area; and 2) project activities would disturb areas or habitat elements known to be used by the species, or would directly affect an individual.

3.0 RESULTS

3.1 Ecological Overview

The project area is an ecotonal zone between the Semidesert grassland and the Arizona upland subdivision of Sonoran desertscrub (Brown 1994). The project area is located in undeveloped desertscrub east of the existing Ryan Airfield infrastructure. Elevations in the project area range from approximately 2,400 to 2,426 feet above mean sea level (amsl). Tucson Mountain Park is approximately 3.5 miles north of the project area, and the Roskruge Mountains are approximately 5 miles northwest of the project area. Vegetation within the project area is relatively undisturbed, with the exception of several existing roads and fences, a berm, and the northern part of the project area that extends approximately east of the runway that has already been cleared. Several ephemeral washes bisect the project area running north-south, and a portion of the project area contained water from recent rains. However, there was no emergent vegetation or other indication that this water persists on site long-term. Glass bottles and other trash are scattered throughout the project area.

No agaves (*Agave* spp.), saguaros (*Carnegiea gigantea*), aquatic habitats (including stock ponds), broadleaf deciduous riparian vegetation communities (i.e., communities containing cottonwood [*Populus* spp.], willow [*Salix* spp.], ash [*Fraxinus* spp.], etc.), or suitable bat roost sites (e.g., natural caves or mine features) occur in the project area.

3.2 Vegetation

The dominant vegetation within uplands in the project area consists of triangle bur ragweed (*Ambrosia deltoidea*), Arizona pencil cholla (*Cylindropuntia arbuscula*), jumping cholla (*C. fulgida*), Christmas cactus (*C. leptocaulis*), walkingstick cactus (*C. spinosior*), pinkflower hedgehog cactus (*Echinocereus fasciculatus*), button brittlebush (*Encelia frutescens*), candy barrelcactus (*Ferocactus wislizeni*), threadleaf snakeweed (*Gutierrezia microcephala*), creosote bush (*Larrea tridentata* var. *tridentata*), water jacket (*Lycium andersonii*), Fremont's desert-thorn (*L. fremontii*), Thornber's fishhook cactus (*Mammillaria thornberi*), cactus apple (*Opuntia engelmannii*), purple pricklypear (*O. macrocentra*), Santa Rita pricklypear (*O. santa-rita*), velvet mesquite (*Prosopis velutina*), whitethorn acacia (*Vachellia constricta*), and lotebush (*Ziziphus obtusifolia*). Grasses commonly observed include purple threeawn (*Aristida purpurea*), spidergrass (*A. ternipes*), Bermudagrass (*Cynodon dactylon*), Arizona cottontop (*Digitaria californica*), stinkgrass (*Eragrostis cilianensis*), Lehmann lovegrass (*E. lehmanniana*), bush muhly (*Muhlenbergia porter*), buffelgrass (*Pennisetum ciliare*), and large-spike bristlegrass (*Setaria macrostachya*). Dominant vegetation along the drainages included flatspine bur ragweed (*Ambrosia acanthicarpa*), ambrosia leaf bur ragweed (*A. ambrosioides*), desertbroom (*Baccharis sarothroides*), spiny hackberry (*Celtis ehrenbergiana*), Jerusalem thorn (*Parkinsonia aculeata*), blue paloverde (*P. florida*), yellow paloverde (*P. microphylla*), velvet mesquite, and whitethorn acacia.

Other plants observed include carelessweed (*Amaranthus palmeri*), bristly fiddleneck (*Amsinckia tessellate*), fourwing saltbush (*Atriplex canescens*), desert marigold (*Baileya multiradiata*), fewflower beggarticks (*Bidens leptocephala*), spiderling (*Boerhavia* sp.), hoary bowlesia (*Bowlesia incana*), Asian mustard (*Brassica tournefortii*), *Chamaesyce* sp., goosefoot (*Chenopodium* sp.), Canadian horseweed (*Conyza canadensis*), fingerleaf gourd (*Cucurbita digitata*), pricklyburr (*Datura inoxia*), western tansymustard (*Descurainia pinnata*), New Mexico silverbush (*Ditaxis neomexicana*), longleaf jointfir (*Ephedra trifurca*), buckwheat (*Eriogonum* sp.), redstem stork's bill (*Erodium cicutarium*), slender janusia (*Janusia gracilis*), shaggyfruit pepperweed (*Lepidium lasiocarpum*), rose bladderpod (*Lesquerella purpurea*), tanseyleaf tansyaster (*Machaeranthera tanacetifolia*), Graham's nipple cactus (*Mammillaria grahamii*), desert tobacco (*Nicotiana obtusifolia*), evening primrose (*Oenothera* sp.), mesquite mistletoe (*Phoradendron californicum*), desert Indianwheat (*Plantago ovata*), unicorn-plant (*Proboscidea* sp.), prickly Russian thistle (*Salsola tragus*), Arabian schismus (*Schismus arabicus*), London rocket (*Sisymbrium irio*), silverleaf nightshade (*Solanum elaeagnifolium*), common sowthistle (*Sonchus oleraceus*), desert globemallow (*Sphaeralcea ambigua*), lyreleaf jewelflower (*Streptanthus carinatus*), woolly tidestromia (*Tidestromia lanuginosa*), and desert zinnia (*Zinnia acerosa*). Several of these species are protected and listed under the Arizona Native Plant Law, which is administered by the Arizona Department of Agriculture (ADA). For more information, please refer to the Biological Regulations Memorandum prepared for this proposed project (SWCA 2016).

Nonnative species observed included: Arabian schismus, Asian mustard, Bermudagrass, buffelgrass, Lehmann lovegrass, London rocket, prickly Russian thistle, and redstem stork’s bill; however, only buffelgrass is a ADA-listed noxious weed species.

3.3 Species Evaluation

Of the 22 species listed for Pima County by the USFWS, one species (PPC) is known to occur in the vicinity of the project. For the remaining 21 species, the project area is clearly beyond the known geographic or elevational range of these species, or it does not contain vegetation or landscape features

known to support these species, or both. Habitat requirements, potential for occurrence, and possible effects of the project on these 22 species are summarized in Table 1.

According to AZHGIS, there are occurrence records for PPC, western narrow-mouthed toad (*Gastrophryne olivacea*), Sonoran desert tortoise (*Gopherus morafkai*), reticulate Gila monster (*Heloderma suspectum suspectum*), and Thornber's fishhook cactus (*Mammillaria thornberi*) within 2 miles of the project area. The PPC is addressed in Table 1. The western narrow-mouthed toad, Sonoran desert tortoise, reticulate Gila monster, and Thornber's fishhook cactus do not receive statutory protection under the ESA, therefore, they are not addressed in this report.

General wildlife species observed during field reconnaissance include coyote (*Canis latrans*) and black-tailed jackrabbit (*Lepus californicus*). In addition, domestic dog (*Canis familiaris*) tracks, kangaroo rat (*Dipodomys* sp.) burrows, collard peccary (*Pecari tajacu*) scat, white-throated woodrat (*Neotoma albigula*) middens, and mule deer (*Odocoileus hemionus*) antlers were observed. Birds observed either visually or aurally in the project area include black-throated sparrow (*Amphispiza bilineata*), verdin (*Auriparus flaviceps*), Gambel's quail (*Callipepla gambelii*), cactus wren (*Campylorhynchus brunneicapillus*), pyrrhuloxia (*Cardinalis sinuatus*), house finch (*Carpodacus mexicanus*), common raven (*Corvus corvax*), greater roadrunner (*Geococcyx californianus*), ash-throated flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), meadowlark (*Sturnella* sp.), curve-billed thrasher (*Toxostoma curvirostre*), mourning dove (*Zenaida macroura*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Table 1. Federally Listed Species Potentially Occurring in Pima County, Arizona

Range or habitat information is from AGFD (2017), AZHGIS (2017); USFWS IPaC (USFWS 2017); Arizona Rare Plant Field Guide (Arizona Rare Plant Committee n.d.); Brennan and Holycross (2006), and Corman and Wise-Gervais (2005).

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Acuña cactus (*Echinomastus erectocentrus* var. *acunensis*)	USFWS E	This cactus occurs in disjunct populations across southern Arizona on well-drained gravel ridges and knolls on granite-derived soils. It grows in the Arizona Upland subdivision of the Sonoran desertscrub plant association at elevations between 1,198 and 2,789 feet amsl. This species occurs in Maricopa, Pima, and Pinal Counties.	Unlikely to occur. Although the habitat present in the project area is similar to areas in which this species is known to exist, the project area is outside the currently known range of this species; thus, its presence is unlikely.	No effect.
California least tern (*Sterna antillarum browni*)	USFWS E	Forms nesting colonies on barren to sparsely vegetated areas. Nests in shallow depressions on open sandy beaches, sandbars, gravel pits, or exposed flats along shorelines of inland rivers, lakes, reservoirs, and drainage systems at elevations below 2,000 feet amsl. Found in Maricopa, Mohave, and Pima Counties.	Unlikely to occur. Suitable habitat for this species is not present in the project area and the project area is not near any areas in which this species has been observed as an occasional migrant in Pima County. Additionally, the project area is above the known elevational range of this species.	No effect.
Canelo Hills ladies' tresses (Spiranthes delitescens)	USFWS E	Found at elevations between 4,585 and 4,970 feet amsl in cienega wetlands, usually intermixed with tall grasses and sedges, on fine-grained, highly organic, saturated soils. Only known from four cienegas in southern Arizona.	Unlikely to occur. This species is not known to occur in Pima County. Further, the project area is below the elevational range of this species, and it does not contain any cienega wetlands.	No effect.

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Chiricahua leopard frog (*Lithobates chiricahuensis*)	USFWS T	Historically occurred in cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet amsl. It is now often restricted to springs, livestock tanks, and streams in the upper portions of watersheds where nonnative predators either have yet to invade or habitats are marginal for them.	Unlikely to occur. The project area is outside the current range of this species, and there are no permanent water sources suitable for this species in or adjacent to the project area. Furthermore, the project area is below the elevational range for this species.	No effect.
Desert pupfish (*Cyprinodon macularius*)	USFWS E	Found in shallow waters of desert springs, small streams, and marshes at elevations below 5,000 feet amsl. One natural population still occurs in Quitobaquito Spring and Quitobaquito Pond in Pima County, and reintroductions have been made in Pima, Pinal, Maricopa, Graham, Cochise, La Paz, and Yavapai Counties.	Unlikely to occur. There are no permanent water sources suitable for this species in or adjacent to the project area.	No effect.
Gila chub (*Gila intermedia*)	USFWS E	Commonly inhabit pools in smaller streams, cienegas, and artificial impoundments ranging in elevation from 2,000 to 5,500 feet amsl. Gila chub are highly secretive, preferring quiet deeper waters, especially pools, or remaining near cover including terrestrial vegetation, boulders, and fallen logs. Adults are often found in deep pools and eddies below areas with swift currents. Young-of-the-year inhabit shallow water among plants or debris, while older juveniles use higher-velocity stream areas.	Unlikely to occur. There are no permanent water sources suitable for this species in or adjacent to the project area.	No effect.
Gila topminnow (*Poeciliopsis occidentalis occidentalis*)	USFWS E	Occurs in small streams, springs, and cienegas at elevations below 4,500 feet amsl, primarily in shallow areas with aquatic vegetation and debris for cover. In Arizona, most of the remaining native populations are in the Santa Cruz River system.	Unlikely to occur. There are no permanent water sources suitable for this species in or adjacent to the project area, and the project area is not within the currently known range of this species.	No effect.
Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*)	USFWS E	Found in cienegas and associated vegetation within Sonoran desertscrub, grassland or oak woodland, and conifer forest between 4,000 and 6,500 feet amsl. This species seems to require an intermediate level of flooding frequency to keep competition manageable, but populations can be destroyed when floods are too frequent and intense. Plants are found in unshaded or shaded sites. They require perennial water, gentle stream gradients, small to medium-sized drainage areas, and (apparently) mild winters. Usually found in water depth from 2 to 6 inches, but occasionally in 10 inches.	Unlikely to occur. There are no permanent water sources suitable for this species in or adjacent to the project area. Additionally, the project area is below the elevational range for this species.	No effect.

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Jaguar (*Panthera onca*)	USFWS E	Jaguars were once prominent in southern Arizona and were found in Sonoran desertscrub up through subalpine conifer forest at elevations between 1,600 and 9,000 feet amsl. Based on 25 historical (from 1902 to 2001) reliable and spatially accurate jaguar sighting records in Arizona, the majority of jaguars were observed in scrub grasslands (56%) and Madrean evergreen forests (20%), all were within 6.2 miles of a water source, and most occurred in moderately rugged to extremely rugged terrain (Hatten et al. 2005). Additionally, river valleys, and other drainage features, likely "provide travel corridors for jaguars, along with higher prey densities, cooler air, and denser vegetation than surrounding habitats" (Jaguar Recovery Team and USFWS 2012:13).	Unlikely to occur. The project area is not located in moderate or extremely rugged terrain or in scrub grasslands or Madrean evergreen forests. This species is extremely rare and although the project area is 19 miles northeast from designated critical habitat, the project area is surrounded by moderate to heavy human disturbance and activity, making it unlikely that a jaguar would use the project area. No breeding populations of jaguar exist in Arizona, and confirmed sightings are generally near the U.S.–Mexico border.	No effect.
Kearney's blue star (*Amsonia kearneyana*)	USFWS E	Plants grow in stable, partially shaded, coarse alluvium along a specific dry wash at 3,600 to 3,800 feet amsl. The wash is lined with desert riparian trees and shrubs. The vegetation surrounding the wash is Sonoran desertscrub or desertscrub-grassland transition zone. Known from a west-facing drainage in the Baboquivari Mountains, Pima County.	Unlikely to occur. This species is only found in a single drainage in the Baboquivari Mountains. Furthermore, the project area is below the known elevational range for this species.	No effect.
Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)	USFWS E	Found in southern Arizona from the Picacho Mountains southwesterly to the Agua Dulce Mountains and southeasterly to the Galiuro and Chiricahua Mountains at elevations between 1,600 and 11,500 feet amsl. Roosts in caves, abandoned mines, and unoccupied buildings at the base of mountains where agave, saguaro, and organ pipe cacti (*Stenocereus thurberi*) are present. Forages at night on nectar, pollen, and fruit of paniculate agaves and columnar cacti. The foraging radius may be 30 to 60 miles per night or more.	Unlikely to occur. The project area does not contain suitable roosting habitat for this species; in addition, a 100% survey of the project footprint was completed and there were no potential forage plants observed (i.e., no saguaro or agave plants).	No effect.
Masked bobwhite (*Colinus virginianus ridgewayi*)	USFWS E	Found in desert grasslands at 1,000 to 4,000 feet amsl with a high diversity of moderately dense native grasses and forbs and adequate brush cover. This subspecies has been found to be closely associated with unarmed acacia (*Acacia angustissima*), apparently using the seeds as a major food in winter, fall, and early spring. Extirpated from the United States around 1900. A refuge population and captive rearing was established in 1985 at Buenos Aires National Wildlife Refuge in the southern Altar Valley in Pima County, Arizona. In 1996, Buenos Aires' masked bobwhite population was estimated at 300–500 individuals.	Unlikely to occur. The species only occurs in southern Pima County on and near the Buenos Aires National Wildlife Refuge, which is approximately 34 miles southwest of the project area.	No effect.

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Northern Mexican gartersnake (*Thamnophis eques megalops*)	USFWS T	This species occurs up to about 8,500 feet amsl, but is most frequently found between 3,000 and 5,000 feet amsl. The Mexican gartersnake uses three general habitat types in Arizona: 1) source area ponds and cienegas; 2) lowland river riparian forests and woodlands; and 3) upland stream gallery forests.	Unlikely to occur. There are no suitable wetlands for this species in or adjacent to the project area. Additionally, the project area is below the known elevational range of this species.	No effect.
Mexican spotted owl (*Strix occidentalis lucida*)	USFWS T	Found in mature montane forests and woodlands and steep, shady, wooded canyons. Can also be found in mixed-conifer and pine-oak vegetation types. Generally nests in older forests of mixed conifers or ponderosa pine (*Pinus ponderosa*)–Gambel oak (*Quercus gambelii*). Nests in live trees on natural platforms (e.g., dwarf mistletoe [*Arceuthobium* spp.] brooms), snags, and canyon walls at elevations between 4,100 and 9,000 feet amsl.	Unlikely to occur. The project area does not contain suitable habitat for this species, and the project area is below the elevational range of this species.	No effect.
Nichol's Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*)	USFWS E	Occurs in unshaded microsites within Sonoran desertscrub on dissected alluvial fans at the foot of limestone mountains and on inclined terraces and saddles on limestone mountainsides. Elevation ranges from 2,400 to 4,100 feet amsl.	Unlikely to occur. The species only occurs on or at the foot of limestone mountains, and the project area does not contain limestone-derived alluvium.	No effect.
Ocelot (*Leopardus pardalis*)	USFWS E	Inhabits desertscrub communities in Arizona. Prey includes rabbits, small rodents, and birds. Universal component is presence of dense cover. In recent years, confirmed sightings of live ocelots made in 2009 and 2011 in Cochise County, Arizona.	Unlikely to occur. The lack of exceptionally thick brush and the proximity to airport and highway makes this very unlikely ocelot habitat.	No effect.
Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*)	USFWS E	This cactus grows in alluvial basins or on hillsides in semi-desert grassland and Sonoran desertscrub in southern Arizona and northern Mexico. Soils range from shallow to deep, and silty to rocky, with a preference for silty to gravely deep alluvial soils. The plant occurs most commonly in open areas on flat ridgetops or areas with less than 10%–15% slope. PPC is found between 2,300 and 4,500 feet amsl in Pima and Santa Cruz Counties. The range extends east from the Baboquivari Mountains to the western foothills of the Santa Rita Mountains. The northernmost boundary is near Tucson.	Unlikely to occur. Although the species is known to occur in the project vicinity, a 100% survey of the footprint of disturbance was completed and no PPC individuals were observed.	No effect.
Sonora chub (*Gila ditaenia*)	USFWS T	Found at an elevation of approximately 3,900 feet amsl in perennial and intermittent small to medium-sized streams, where it prefers pools near cliffs, boulders, or other cover in stream channels. In Arizona, its range includes Sycamore Creek and Peñasco Canyon in the Atascosa Mountains and California Gulch in Santa Cruz County.	Unlikely to occur. This species is not known to occur in Pima County. Further, the project area lacks suitable permanent water sources required by this species.	No effect.

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Sonoran pronghorn (*Antilocapra americana sonoriensis*)	USFWS E	Found in Sonoran desertscrub within broad, intermountain alluvial valleys with creosote (*Larrea tridentata*)–bursage (*Ambrosia* spp.) and palo verde (*Parkinsonia* spp.)–mixed cacti associations at elevations between 2,000 and 4,000 feet amsl. The only extant U.S. population is in southwestern Arizona.	Unlikely to occur. Although the project area contains vegetation communities (i.e., palo verde-mixed cacti association) similar to ones in which this species is known to occur, the project area is not located within the currently known range of this species.	No effect.
Sonoyta mud turtle (*Kinosternon sonoriense longifemorale*)	USFWS C	In Arizona, found only in pond and stream habitat at Quitobaquito Springs in Organ Pipe Cactus National Monument. This subspecies of the more common Sonora mud turtle (*Kinosternon sonoriense sonoriense*) also occurs in Rio Sonoyta, Mexico.	Unlikely to occur. Due to the limited range of this species and the lack of suitable permanent water sources in or adjacent to the project area, it is unlikely to occur in the project area.	No impact.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	USFWS E	Found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*), buttonbush (*Cephalanthus* spp.), and arrowweed (*Pluchea sericea*) are present. Nests are found in thickets of trees and shrubs, primarily those that are 13 to 23 feet high, among dense, homogeneous foliage. Habitat occurs at elevations below 8,500 feet amsl.	Unlikely to occur. Suitable habitat for this species is not present in the project area.	No effect.
Yellow-billed cuckoo (*Coccyzus americanus*)	USFWS T	Typically found in riparian woodland vegetation (cottonwood, willow, or saltcedar) at elevations below 6,600 feet amsl. Dense understory foliage appears to be an important factor in nest site selection. The highest concentrations in Arizona are along the Agua Fria, San Pedro, upper Santa Cruz, and Verde River drainages and Cienega and Sonoita Creeks.	Unlikely to occur. There is no riparian woodland habitat within the project area.	No effect.

* USFWS Status Definitions

C = Candidate. Candidate species are those for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as endangered or threatened under the ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.

E = Endangered. Endangered species are those in imminent jeopardy of extinction. The ESA specifically prohibits the take of a species listed as endangered. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.

T = Threatened. Threatened species are those in imminent jeopardy of becoming endangered. The ESA prohibits the take of a species listed as threatened under Section 4d of the ESA. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.

4.0 LIMITATIONS AND WARRANTY

Within the limitations of schedule, budget, and scope of work, SWCA warrants that this study was conducted in accordance with accepted environmental science practices, including the technical guidelines, evaluation criteria, and species' listing status in effect at the time this evaluation was performed, as outlined in the species evaluation.

The results and conclusions of this report represent the best professional judgment of SWCA scientists and are based on information provided by the project proponent and on information obtained from agencies and other sources during the course of the study. No other warranty, expressed or implied, is made. This report should be reviewed by the appropriate regulatory agencies prior to any detailed site-planning or construction activities.

5.0 LITERATURE CITED

Arizona Game and Fish Department (AGFD). 2017. Plant and animal abstracts, distribution maps, and illustrations. Available at: http://www.azgfd.com/w_c/edits/hdms_abstracts.shtml. August 2017.

Arizona Heritage Geographic Information System (AZHGIS). 2017. Arizona Game and Fish Department online environmental review tool. Available at: http://www.azgfd.gov/hgis. Accessed August 2017.

Arizona Rare Plant Committee. n.d. [2001]. *Arizona Rare Plant Field Guide*. Washington, D.C.: U.S. Government Printing Office.

Brennan, T.C, and A.T. Holycross. 2006. *A Field Guide to Amphibians and Reptiles in Arizona*. Phoenix: Arizona Game and Fish Department.

Brown, D.E. (ed.). 1994. *Biotic Communities: Southwestern United States and Northwestern Mexico*. Salt Lake City: University of Utah Press.

Corman, T.E., and C. Wise-Gervais. 2005. *Arizona Breeding Bird Atlas*. Albuquerque: University of New Mexico Press.

Hall, L.S., P.R. Krausman, and M.L. Morrison. 1997. The habitat concept and a plea for standard terminology. *Wilson Society Bulletin* 25:173–182.

Hatten, J.R., A. Averill-Murray, and W.E. Van Pelt. 2005. A spatial model of potential jaguar habitat in Arizona. *Journal of Wildlife Management* 69(3):1024–1033.

Jaguar Recovery Team and U.S. Fish and Wildlife Service (USFWS). 2012. *Recovery Outline for the Jaguar (*Panthera onca*).* Available at: http://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/Jaguar/049777%20-%20Jaguar%20Recovery%20Outline.pdf. Accessed August 2017.

Natural Resources Conservation Service. 2017. The PLANTS Database. Available at: http://plants.usda.gov. Accessed August 2017.

Roller, P. 1996. *Pima Pineapple Cactus Recommended Survey Protocol: 3-Tier Survey Methods.* Available at: https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/PimaPineappleCactus/ppc_survey_protocol.pdf. Accessed August 2017.

SWCA Environmental Consultants (SWCA). 2016. *Biological Regulations Memorandum for Ryan Airfield Drainage Improvements Phase I Project.* Tucson, Arizona. January.

U.S. Fish and Wildlife Service (USFWS). 2017. List of threatened and endangered species for Pima County. Information for Planning and Consultation (IPaC) system. Available at: http://ecos.fws.gov/ipac/wizard/trustResourceList!prepare.action. Accessed August 2017.

APPENDIX A

USFWS IPaC Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513
http://www.fws.gov/southwest/es/arizona/
http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

In Reply Refer To: August 21, 2017
Consultation Code: 02EAAZ00-2017-SLI-1078
Event Code: 02EAAZ00-2017-E-02500
Project Name: Ryan Airfield Drainage Improvements

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that may occur within one or more delineated United States Geological Survey 7.5 minute quadrangles with which your project polygon intersects. Each quadrangle covers, at minimum, 49 square miles. Please refer to the species information links found at http://www.fws.gov/southwest/es/arizona/Docs_Species.htm or http://www.fws.gov/southwest/es/arizona/Documents/MiscDocs/AZSpeciesReference.pdf for a quick reference to determine if suitable habitat for the species on your list occurs in your project area.

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to determine whether projects may affect federally listed species and/or designated critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If the Federal action agency determines that listed species or critical habitat may be affected by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. An effect exists even if only one individual or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint" (e.g., downstream). If the Federal action agency determines that the action may jeopardize a proposed species or adversely modify proposed critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.

Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 et seq.). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1026 species of birds are protected by the MBTA, including the western burrowing owl (Athene cunicularia hypugea). Protected western burrowing owls can be found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle (or golden eagle) nest occurs in or near the proposed project area, our office should be contacted for Technical Assistance. An evaluation must be performed to determine whether the project is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles (see https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-docume and https://www.fws.gov/birds/management/managed-species/eagle-management.php).

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEPA, and permitting processes, please visit the following web site: https://www.fws.gov/birds/management.php. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at:
https://www.fws.gov/migratorybirds/pdf/management/usfwscommtowerguidance2016update.pdf.

Activities that involve streams (including intermittent streams) and/or wetlands are regulated by the U.S. Army Corps of Engineers (Corps). We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National

Wildlife Refuge, we recommend that you contact refuge staff for specific information about refuge resources.

If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated. For more information, please contact our tribal coordinator, John Nystedt, at 928/556-2160 or John_Nystedt@fws.gov.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (Gopherus morafkai) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program (https://www.azgfd.com/wildlife/planning/projevalprogram/).

For additional communications regarding this project, please refer to the consultation Tracking Number in the header of this letter. We appreciate your concern for threatened and endangered species. If we may be of further assistance, please contact Brenda Smith at 928/556-2157 for projects in northern Arizona, our general Phoenix number 602/242-0210 for central Arizona, or 520/670-6144 for projects in southern Arizona.

Sincerely,

/s/

Steven L. Spangle Field Supervisor

Attachment

Attachment(s):

- Official Species List

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Pima County, Arizona

Local office

Arizona Ecological Services Field Office

(602) 242-0210
(602) 242-2513

9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517

http://www.fws.gov/southwest/es/arizona/
http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species

[1] are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Jaguar Panthera onca There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat. https://ecos.fws.gov/ecp/species/3944	Endangered
Lesser Long-nosed Bat Leptonycteris curasoae yerbabuenae No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3245	Endangered
Ocelot Leopardus (=Felis) pardalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4474	Endangered
Sonoran Pronghorn Antilocapra americana sonoriensis U.S.A. (AZ), Mexico No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4750	EXPN
Sonoran Pronghorn Antilocapra americana sonoriensis Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4750	Endangered

Birds

NAME	STATUS
California Least Tern Sterna antillarum browni No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
Masked Bobwhite (quail) Colinus virginianus ridgwayi No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3484	Endangered

Mexican Spotted Owl Strix occidentalis lucida — Threatened

There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat.
https://ecos.fws.gov/ecp/species/8196

Southwestern Willow Flycatcher Empidonax traillii extimus — Endangered

There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat.
https://ecos.fws.gov/ecp/species/6749

Yellow-billed Cuckoo Coccyzus americanus — Threatened

There is a **proposed** critical habitat for this species. Your location overlaps the proposed critical habitat.
https://ecos.fws.gov/ecp/species/3911

Reptiles

NAME	STATUS
Northern Mexican Gartersnake Thamnophis eques megalops	Threatened
Sonoyta Mud Turtle Kinosternon sonoriense longifemorale	Proposed Endangered

There is a **proposed** critical habitat for this species. Your location overlaps the proposed critical habitat.
https://ecos.fws.gov/ecp/species/7655

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/7276

Amphibians

NAME	STATUS
Chiricahua Leopard Frog Rana chiricahuensis	Threatened

There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat.
https://ecos.fws.gov/ecp/species/1516

Fishes

NAME	STATUS
Desert Pupfish Cyprinodon macularius There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat. https://ecos.fws.gov/ecp/species/7003	Endangered
Gila Chub Gila intermedia There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat. https://ecos.fws.gov/ecp/species/51	Endangered
Gila Topminnow (incl. Yaqui) Poeciliopsis occidentalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1116	Endangered
Sonora Chub Gila ditaenia There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. https://ecos.fws.gov/ecp/species/1394	Threatened

Flowering Plants

NAME	STATUS
Acuna Cactus Echinomastus erectocentrus var. acunensis There is a **final** critical habitat designated for this species. Your location overlaps the designated critical habitat. https://ecos.fws.gov/ecp/species/5785	Endangered
Canelo Hills Ladies-tresses Spiranthes delitescens No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8098	Endangered

Huachuca Water-umbel Lilaeopsis schaffneriana var. recurva — Endangered

There is a **final** critical habitat designated for this species.
Your location is outside the designated critical habitat.
https://ecos.fws.gov/ecp/species/1201

Kearney's Blue-star Amsonia kearneyana — Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/7485

Nichol's Turk's Head Cactus Echinocactus horizonthalonius var. nicholii — Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5343

Pima Pineapple Cactus Coryphantha scheeri var. robustispina — Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4919

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Acuna Cactus Echinomastus erectocentrus var. acunensis https://ecos.fws.gov/ecp/species/5785#crithab	Final designated
Chiricahua Leopard Frog Rana chiricahuensis https://ecos.fws.gov/ecp/species/1516#crithab	Final designated
Desert Pupfish Cyprinodon macularius https://ecos.fws.gov/ecp/species/7003#crithab	Final designated

Gila Chub Gila intermedia https://ecos.fws.gov/ecp/species/51#crithab	Final designated
Jaguar Panthera onca https://ecos.fws.gov/ecp/species/3944#crithab	Final designated
Mexican Spotted Owl Strix occidentalis lucida https://ecos.fws.gov/ecp/species/8196#crithab	Final designated
Northern Mexican Gartersnake Thamnophis eques megalops https://ecos.fws.gov/ecp/species/7655#crithab	Proposed
Southwestern Willow Flycatcher Empidonax traillii extimus https://ecos.fws.gov/ecp/species/6749#crithab	Final designated
Yellow-billed Cuckoo Coccyzus americanus https://ecos.fws.gov/ecp/species/3911#crithab	Proposed

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act [1] and the Bald and Golden Eagle Protection Act [2].

Any activity that results in the take (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service [3]. There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

1. The Migratory Birds Treaty Act of 1918.

2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The migratory birds species listed below are species of particular conservation concern (e.g. Birds of Conservation Concern) that may be potentially affected by activities in this location. It is not a list of every bird species you may find in this location, nor a guarantee that all of the bird species on this list will be found on or near this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the AKN Histogram Tools and Other Bird Data Resources. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

NAME	SEASON(S)
Allen's Hummingbird Selasphorus sasin https://ecos.fws.gov/ecp/species/9637	Migrating
Arizona Woodpecker Picoides arizonae	Year-round
Baird's Sparrow Ammodramus bairdii https://ecos.fws.gov/ecp/species/5113	Wintering
Bald Eagle Haliaeetus leucocephalus https://ecos.fws.gov/ecp/species/1626	Wintering
Bell's Vireo Vireo bellii https://ecos.fws.gov/ecp/species/9507	Breeding

Bendire's Thrasher Toxostoma bendirei https://ecos.fws.gov/ecp/species/9435	Year-round
Black-chinned Sparrow Spizella atrogularis https://ecos.fws.gov/ecp/species/9447	Wintering
Black-throated Gray Warbler Dendroica nigrescens	Breeding, Migrating
Blue-throated Hummingbird Lampornis clemenciae	Breeding
Botteri's Sparrow Aimophila botterii	Breeding
Brewer's Sparrow Spizella breweri https://ecos.fws.gov/ecp/species/9291	Wintering
Buff-breasted Flycatcher Empidonax fulvifrons https://ecos.fws.gov/ecp/species/9586	Year-round
Burrowing Owl Athene cunicularia https://ecos.fws.gov/ecp/species/9737	Year-round
Calliope Hummingbird Stellula calliope https://ecos.fws.gov/ecp/species/9526	Migrating
Canyon Towhee Pipilo fuscus	Year-round
Chestnut-collared Longspur Calcarius ornatus	Wintering
Common Black-hawk Buteogallus anthracinus	Breeding
Costa's Hummingbird Calypte costae https://ecos.fws.gov/ecp/species/9470	Year-round
Elegant Trogon Trogon elegans	Year-round

Elf Owl *Micrathene whitneyi* https://ecos.fws.gov/ecp/species/9085	Breeding
Five-striped Sparrow *Aimophila quinquestriata*	Breeding
Flammulated Owl *Otus flammeolus* https://ecos.fws.gov/ecp/species/7728	Breeding
Fox Sparrow *Passerella iliaca*	Wintering
Gila Woodpecker *Melanerpes uropygialis* https://ecos.fws.gov/ecp/species/5960	Year-round
Gilded Flicker *Colaptes chrysoides* https://ecos.fws.gov/ecp/species/2960	Year-round
Golden Eagle *Aquila chrysaetos* https://ecos.fws.gov/ecp/species/1680	Year-round
Grace's Warbler *Dendroica graciae*	Breeding
Grasshopper Sparrow *Ammodramus savannarum ammolegus*	Year-round
Gray Vireo *Vireo vicinior* https://ecos.fws.gov/ecp/species/8680	Breeding, Wintering
Lark Bunting *Calamospiza melanocorys*	Wintering
Lawrence's Goldfinch *Carduelis lawrencei* https://ecos.fws.gov/ecp/species/9464	Year-round
Le Conte's Thrasher *toxostoma lecontei* https://ecos.fws.gov/ecp/species/8969	Year-round

Least Bittern Ixobrychus exilis https://ecos.fws.gov/ecp/species/6175	Year-round
Lewis's Woodpecker Melanerpes lewis https://ecos.fws.gov/ecp/species/9408	Wintering
Loggerhead Shrike Lanius ludovicianus https://ecos.fws.gov/ecp/species/8833	Year-round
Long-billed Curlew Numenius americanus https://ecos.fws.gov/ecp/species/5511	Wintering
Lucifer Hummingbird Calothorax lucifer	Breeding
Lucy's Warbler Vermivora luciae https://ecos.fws.gov/ecp/species/6626	Breeding
Mccown's Longspur Calcarius mccownii https://ecos.fws.gov/ecp/species/9292	Wintering
Mountain Plover Charadrius montanus https://ecos.fws.gov/ecp/species/3638	Wintering
Northern Beardless-tyrannulet Camptostoma imberbe	Breeding
Olive Warbler Peucedramus taeniatus	Year-round
Peregrine Falcon Falco peregrinus https://ecos.fws.gov/ecp/species/8831	Year-round
Phainopepla phainopepla nitens https://ecos.fws.gov/ecp/species/1372	Year-round
Pinyon Jay Gymnorhinus cyanocephalus https://ecos.fws.gov/ecp/species/9420	Year-round

Prairie Falcon Falco mexicanus https://ecos.fws.gov/ecp/species/4736	Year-round
Red-faced Warbler Cardellina rubrifrons	Breeding
Rose-throated Becard Pachyramphus aglaiae	Breeding
Rufous Hummingbird selasphorus rufus https://ecos.fws.gov/ecp/species/8002	Migrating
Rufous-crowned Sparrow Aimophila ruficeps https://ecos.fws.gov/ecp/species/9718	Year-round
Rufous-winged Sparrow Aimophila carpalis	Year-round
Short-eared Owl Asio flammeus https://ecos.fws.gov/ecp/species/9295	Wintering
Sonoran Yellow Warbler Dendroica petechia ssp. sonorana https://ecos.fws.gov/ecp/species/2893	Breeding, Migrating
Sprague's Pipit Anthus spragueii https://ecos.fws.gov/ecp/species/8964	Wintering
Swainson's Hawk Buteo swainsoni https://ecos.fws.gov/ecp/species/1098	Breeding
Varied Bunting Passerina versicolor	Breeding
Virginia's Warbler Vermivora virginiae https://ecos.fws.gov/ecp/species/9441	Breeding
Williamson's Sapsucker Sphyrapicus thyroideus https://ecos.fws.gov/ecp/species/8832	Wintering

Willow Flycatcher Empidonax traillii Breeding
https://ecos.fws.gov/ecp/species/3482

What does IPaC use to generate the list of migratory bird species potentially occurring in my specified location?

Landbirds:

Migratory birds that are displayed on the IPaC species list are based on ranges in the latest edition of the National Geographic Guide, Birds of North America (6th Edition, 2011 by Jon L. Dunn, and Jonathan Alderfer). Although these ranges are coarse in nature, a number of U.S. Fish and Wildlife Service migratory bird biologists agree that these maps are some of the best range maps to date. These ranges were clipped to a specific Bird Conservation Region (BCR) or USFWS Region/Regions, if it was indicated in the 2008 list of Birds of Conservation Concern (BCC) that a species was a BCC species only in a particular Region/Regions. Additional modifications have been made to some ranges based on more local or refined range information and/or information provided by U.S. Fish and Wildlife Service biologists with species expertise. All migratory birds that show in areas on land in IPaC are those that appear in the 2008 Birds of Conservation Concern report.

Atlantic Seabirds:

Ranges in IPaC for birds off the Atlantic coast are derived from species distribution models developed by the National Oceanic and Atmospheric Association (NOAA) National Centers for Coastal Ocean Science (NCCOS) using the best available seabird survey data for the offshore Atlantic Coastal region to date. NOAANCCOS assisted USFWS in developing seasonal species ranges from their models for specific use in IPaC. Some of these birds are not BCC species but were of interest for inclusion because they may occur in high abundance off the coast at different times throughout the year, which potentially makes them more susceptible to certain types of development and activities taking place in that area. For more refined details about the abundance and richness of bird species within your project area off the Atlantic Coast, see the Northeast Ocean Data Portal. The Portal also offers data and information about other types of taxa that may be helpful in your project review.

About the NOAANCCOS models: the models were developed as part of the NOAANCCOS project: Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf. The models resulting from this project are being used in a number of decision-support/mapping products in order to help guide decision-making on activities off the Atlantic Coast with the goal of reducing impacts to migratory birds. One such product is the Northeast Ocean Data Portal, which can be used to explore details about the relative occurrence and abundance of bird species in a particular area off the Atlantic Coast.

All migratory bird range maps within IPaC are continuously being updated as new and better information becomes available.

Can I get additional information about the levels of occurrence in my project area of specific birds or groups of birds listed in IPaC?

Landbirds:

The Avian Knowledge Network (AKN) provides a tool currently called the "Histogram Tool", which draws from the data within the AKN (latest,survey, point count, citizen science datasets) to create a view of relative abundance of species within a particular location over the course of the year. The results of the tool depict the frequency of detection of a species in survey events, averaged between multiple datasets within AKN in a particular week of the year. You may access the histogram tools through the Migratory Bird Programs AKN Histogram Tools webpage.

The tool is currently available for 4 regions (California, Northeast U.S., Southeast U.S. and Midwest), which encompasses the following 32 states: Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, North, Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

In the near future, there are plans to expand this tool nationwide within the AKN, and allow the graphs produced to appear with the list of trust resources generated by IPaC, providing you with an additional level of detail about the level of occurrence of the species of particular concern potentially occurring in your project area throughout the course of the year.

Atlantic Seabirds:

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAANCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Facilities

Wildlife refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuges:

REFUGE	ACRES
Buenos Aires National Wildlife Refuge	234,884.41 acres

(520) 823-4251
(520) 823-4247

MAILING ADDRESS
P.O. Box 109
Sasabe, AZ 85633-0109

PHYSICAL ADDRESS
7.5 Miles North Of Sasabe On Highway 286
Sasabe, AZ 85633

https://www.fws.gov/refuges/profiles/index.cfm?id=22530

Cabeza Prieta National Wildlife Refuge	1,711,044.23 acres

(520) 387-6483
(520) 387-5359

1611 North Second Avenue
Ajo, AZ 85321-1634

https://www.fws.gov/refuges/profiles/index.cfm?id=22571

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO

FRESHWATER POND

- PUB
- PUS
- PUBHx
- PUBFh

LAKE

- L2UB
- L1UB

OTHER

- PUSAx
- PUSA

RIVERINE

- R4SB
- R4USA
- R2UBF
- R2UB
- R2USC
- R2EM

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible

hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
(602) 242-0210

Project Summary

Consultation Code: 02EAAZ00-2017-SLI-1078

Event Code: 02EAAZ00-2017-E-02500

Project Name: Ryan Airfield Drainage Improvements

Project Type: TRANSPORTATION

Project Description: Construct a berm to allow for a CLOMR request to remove airport facilities from the 100-year floodplain.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/32.13575449900006N111.16884076180646W

Counties: Pima, AZ

Endangered Species Act Species

There is a total of 8 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Mammals

NAME	STATUS
Jaguar *Panthera onca* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3944	Endangered
Lesser Long-nosed Bat *Leptonycteris curasoae yerbabuenae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3245	Endangered
Sonoran Pronghorn *Antilocapra americana sonoriensis* Population: U.S.A. (AZ), Mexico No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4750	Experimental Population, Non-Essential

Birds

NAME	STATUS
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is a **proposed** critical habitat for this species. Your location is outside the proposed critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Northern Mexican Gartersnake *Thamnophis eques megalops* There is a **proposed** critical habitat for this species. Your location is outside the proposed critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7655	Threatened
Sonoyta Mud Turtle *Kinosternon sonoriense longifemorale* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7276	Proposed Endangered

Flowering Plants

NAME	STATUS
Pima Pineapple Cactus *Coryphantha scheeri var. robustispina* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4919	Endangered

Critical habitats

There are no critical habitats within your project area under this office's jurisdiction.

APPENDIX B

AZHGIS Online Environmental Review Results

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
Ryan Airfield Drainage Improvemnts

User Project Number:
28352

Project Description:
Construct a berm to remove airfield facilities from 100-year floodplain.

Project Type:
Transportation & Infrastructure, Airports, Maintenance on existing runways, taxiways, terminals/concourses, runway obstruction clearance, facilities, beacons, control towers, storm water run off controls, de-icing, fuel depots

Contact Person:
Russell Waldron

Organization:
SWCA

On Behalf Of:
OTHER_FED

Project ID:
HGIS-05974

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

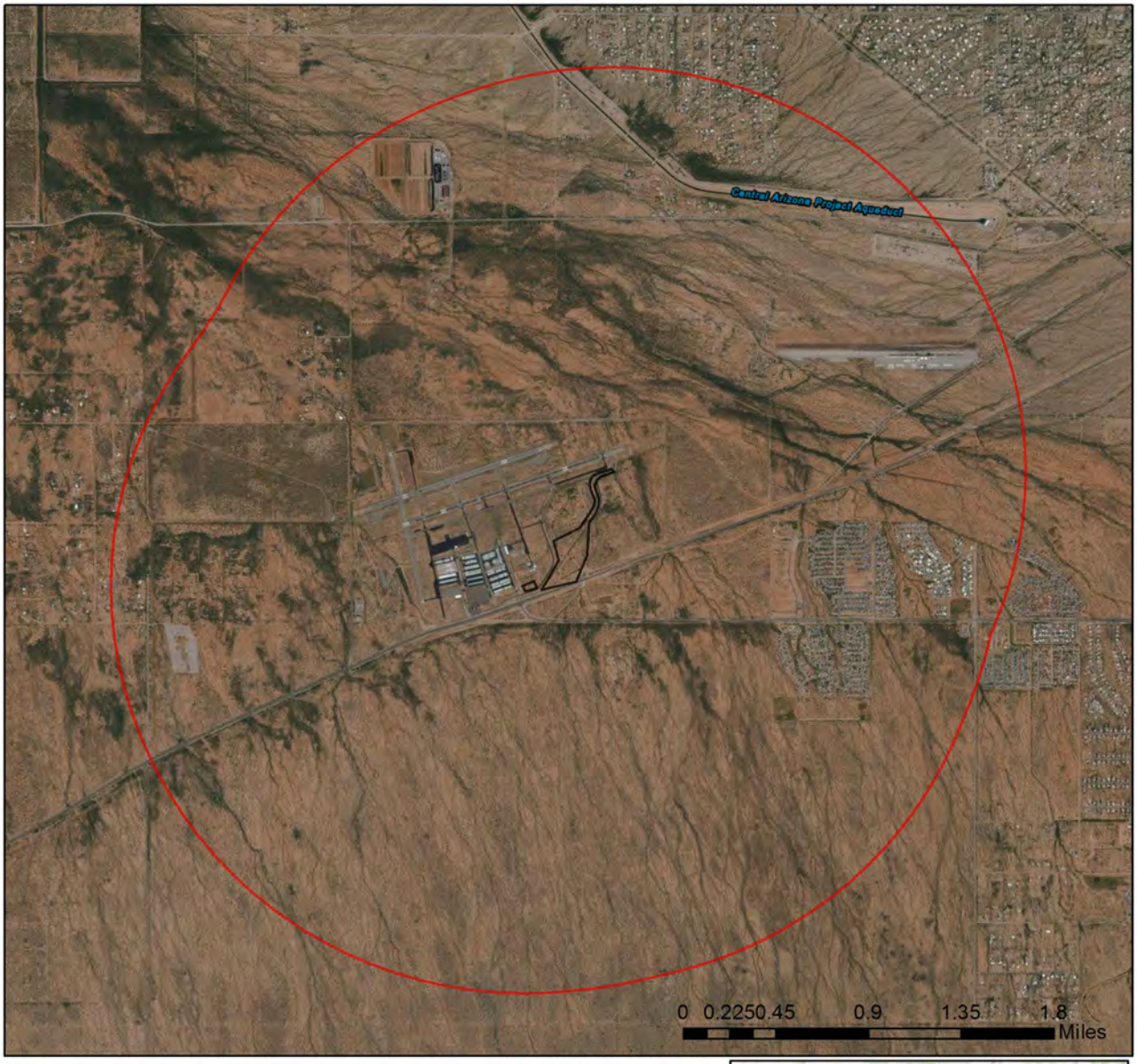
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

Ryan Airfield Drainage Improvemnts

Aerial Image Basemap With Locator Map



Project Boundary

Buffered Project Boundary

Project Size (acres): 31.69

Lat/Long (DD): 32.1385 / -111.1653

County(s): Pima

AGFD Region(s): Tucson

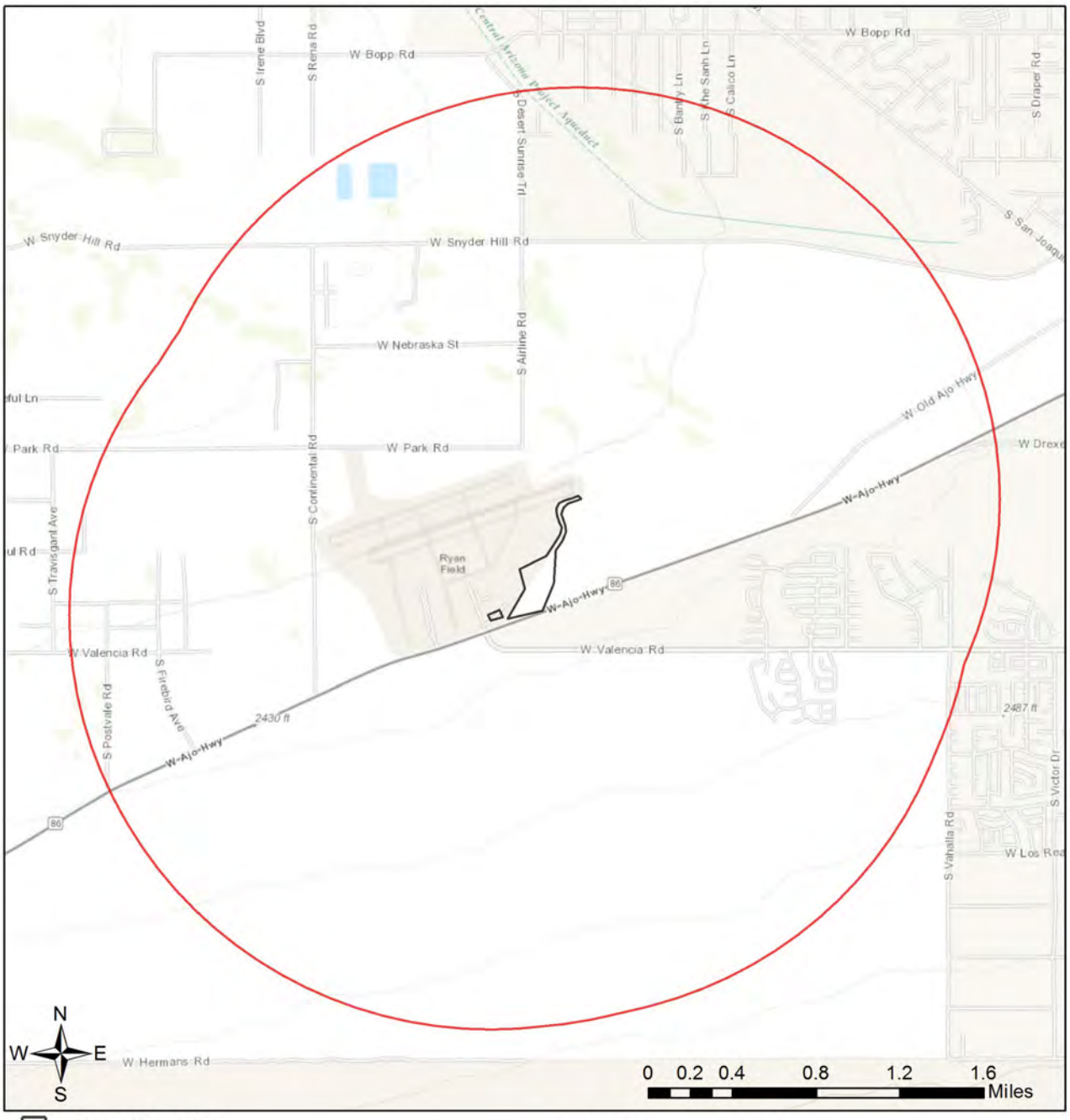
Township/Range(s): T15S, R11E; T15S, R12E

USGS Quad(s): BROWN MOUNTAIN

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong),

Ryan Airfield Drainage Improvemnts

Web Map As Submitted By User



Project Boundary

Buffered Project Boundary

Project Size (acres): 31.69

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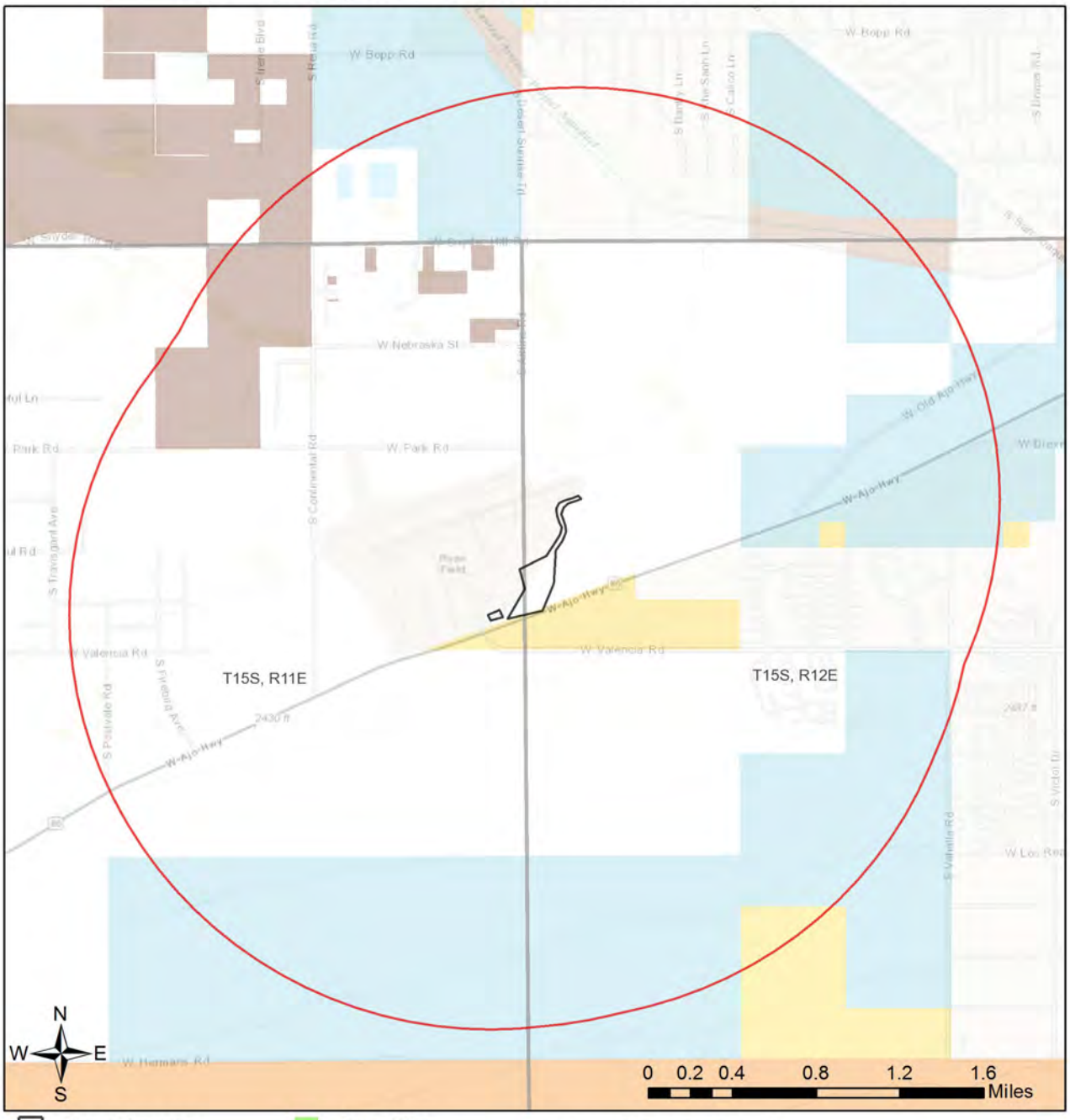
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Ryan Airfield Drainage Improvemnts

Topo Basemap With Township/Ranges and Land Ownership



- Project Boundary
- Buffered Project Boundary
- Township/Ranges
- AZ Game and Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State and Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge

Project Size (acres): 31.69

Lat/Long (DD): 32.1385 / -111.1653

County(s): Pima

AGFD Region(s): Tucson

Township/Range(s): T15S, R11E; T15S, R12E

USGS Quad(s): BROWN MOUNTAIN

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Special Status Species and Special Areas Documented within 2 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE			HS	
Gastrophryne olivacea	Western Narrow-mouthed Toad			S		1C
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Heloderma suspectum suspectum	Reticulate Gila Monster					1A
Mammillaria thornberi	Thornber Fishhook Cactus				SR	

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need
Predicted within Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aix sponsa	Wood Duck					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anaxyrus retiformis	Sonoran Green Toad			S		1B
Anthus spragueii	Sprague's Pipit	SC				1A
Aquila chrysaetos	Golden Eagle			S		1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Botaurus lentiginosus	American Bittern					1B
Buteo regalis	Ferruginous Hawk	SC		S		1B
Chilomeniscus stramineus	Variable Sandsnake					1B
Colaptes chrysoides	Gilded Flicker			S		1B
Coluber bilineatus	Sonoran Whipsnake					1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus tigris	Tiger Rattlesnake					1B
Crotaphytus nebrius	Sonoran Collared Lizard					1B
Dipodomys spectabilis	Banner-tailed Kangaroo Rat			S		1B
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	SC	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Haliaeetus leucocephalus	Bald Eagle	SC	S	S		1A
Heloderma suspectum	Gila Monster					1A
Incilius alvarius	Sonoran Desert Toad					1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE				1A
Lepus alleni	Antelope Jackrabbit					1B

Species of Greatest Conservation Need
Predicted within Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Melanerpes uropygialis	Gila Woodpecker					1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Micruroides euryxanthus	Sonoran Coralsnake					1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Panthera onca	Jaguar	LE				1A
Passerculus sandwichensis	Savannah Sparrow					1B
Perognathus amplus	Arizona Pocket Mouse					1B
Peucaea carpalis	Rufous-winged Sparrow					1B
Phrynosoma solare	Regal Horned Lizard					1B
Phyllorhynchus browni	Saddled Leaf-nosed Snake					1B
Progne subis hesperia	Desert Purple Martin			S		1B
Setophaga petechia	Yellow Warbler					1B
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Troglodytes pacificus	Pacific Wren					1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox	No Status				1B

Species of Economic and Recreation Importance Predicted within Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Callipepla squamata	Scaled Quail					1C
Odocoileus hemionus	Mule Deer					
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Transportation & Infrastructure, Airports, Maintenance on existing runways, taxiways, terminals/concourses, runway obstruction clearance, facilities, beacons, control towers, storm water run off controls, de-icing, fuel depots

Project Type Recommendations:
Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use. Use only the minimum amount of light needed for safety. Narrow spectrum bulbs should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded, canted, or cut to ensure that light reaches only areas needing illumination.

Consider tower designs and/or modifications that reduce or eliminate impacts to migratory birds (i.e. free standing, minimally lighted structures).

Follow manufacturer's recommended application guidelines for all chemical treatments. The U.S. Fish and Wildlife Service, Region 2, Environmental Contaminants Program has a reference document that serves as their regional pesticide recommendations for protecting wildlife and fisheries resources, titled "Recommended Protection Measures for Pesticide Applications in Region 2 of the USFWS", http://www.fws.gov/southwest/es/arizona/Documents/ECReports/RPMPA_2007.pdf. The Department recommends that direct or indirect impacts to sensitive species and their forage base from the application of chemical pesticides or herbicides be considered carefully.

Minimization and mitigation of impacts to wildlife and fish species due to changes in water quality, quantity, chemistry, temperature, and alteration to flow regimes (timing, magnitude, duration, and frequency of floods) should be evaluated. Minimize impacts to springs, in-stream flow, and consider irrigation improvements to decrease water use. If dredging is a project component, consider timing of the project in order to minimize impacts to spawning fish and other aquatic species (include spawning seasons), and to reduce spread of exotic invasive species. We recommend early direct coordination with Project Evaluation Program for projects that could impact water resources, wetlands, streams, springs, and/or riparian habitats.

Based on the project type entered, coordination with Arizona Department of Environmental Quality may be required (http://www.azdeq.gov/).

Project Location and/or Species Recommendations:
HDMS records indicate that one or more native plants listed on the Arizona Native Plant Law and Antiquities Act have been documented within the vicinity of your project area. Please contact:
Arizona Department of Agriculture
1688 W Adams St.
Phoenix, AZ 85007
Phone: 602.542.4373
https://agriculture.az.gov/environmental-services/np1

HDMS records indicate that one or more listed, proposed, or candidate species or Critical Habitat (Designated or Proposed) have been documented in the vicinity of your project. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at http://www.fws.gov/southwest/es/arizona/ or:

Phoenix Main Office
2321 W. Royal Palm Rd, Suite 103
Phoenix, AZ 85021
Phone: 602-242-0210
Fax: 602-242-2513

Tucson Sub-Office
201 N. Bonita Suite 141
Tucson, AZ 85745
Phone: 520-670-6144
Fax: 520-670-6155

Flagstaff Sub-Office
SW Forest Science Complex
2500 S. Pine Knoll Dr.
Flagstaff, AZ 86001
Phone: 928-556-2157
Fax: 928-556-2121

Appendix F – Archaeological Survey

Prepared by SWCA, Inc., 2017

SWCA®
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

Archaeological Survey of 126 Acres for the Proposed Ryan Airfield Drainage Improvements Phase I Project in Tucson, Pima County, Arizona

Prepared for

Tucson Airport Authority

Prepared by

SWCA Environmental Consultants

February 2016
(Revised August 2017)

ARCHAEOLOGICAL SURVEY OF 126 ACRES FOR THE PROPOSED RYAN AIRFIELD DRAINAGE IMPROVEMENTS PHASE I PROJECT IN TUCSON, PIMA COUNTY, ARIZONA

Prepared for

Tucson Airport Authority
7005 South Plumer Avenue
Tucson, Arizona 85756
Attn: Eric Roudebush

Prepared by

David M. R. Barr, M.A.,
Eric S. Petersen

SWCA Environmental Consultants
343 West Franklin Street
Tucson, Arizona 85701
(520) 325-9194
www.swca.com

Arizona Antiquities Act Blanket Permit Nos. 2016-008bl; 2017-034bl

SWCA Project No. 28352

SWCA Cultural Resources Report No. 16-56

February 2016
(Revised August 2017)

I. REPORT TITLE

Report Title: Archaeological Survey of 126 Acres for the Proposed Ryan Airfield Drainage Improvements Phase I Project in Tucson, Pima County, Arizona

Report Author(s): David M. R. Barr and Eric S. Petersen

Date: August 4, 2017

Report No.: 16-56

☐ Check if this submittal is SRSF for Negative Survey

II. AZSITE & SHPO INFORMATION

ASM Accession Number: 2016-023

AAA Permit No.: 2016-008bl; 2017-034

SHPO-20__:

Project Locator UTMs: 484879 mE 3556121 mN Zone NAD 83

USGS 7.5' Quadrangle Name: Brown Mountain, Arizona

III. CONSULTING FIRM INFORMATION

Organization/Consulting Firm: SWCA Environmental Consultants

Internal Project Number: 28352

Contact Name: David M. R. Barr

Address: 343 West Franklin Street, Tucson, Arizona 85701

Phone: (520) 325-9194

Email: dbarr@swca.com

IV. AGENCY/PROJECT INFORMATION

Lead Agency/Project Number: Tucson Airport Authority

Agency Project Name/Number: N/A

Route, Mileposts Limits (ADOT projects): N/A

Nearest City/Town & County: Tucson, Pima County, Arizona

Address: N/A

Project Sponsor: C&S Engineers, Inc.

Funding Source(s) (Federal, State, and/or Private): Federal

Other Permitting/Land Agencies & Permit Numbers: Federal Aviation Administration (FAA); U.S. Army Corps of Engineers (USACE)

ASLD Lease Application No.: N/A

V. PROJECT DESCRIPTION

SWCA Environmental Consultants (SWCA) was subcontracted by C&S Engineers, Inc., to complete an archaeological survey for the Tucson Airport Authority Ryan Airfield Drainage Improvements Phase I Project, located in Pima County, Arizona. The project area consists of approximately 126 acres in Section 7, Township 15 South, Range 12 East; Section 12, Township 15 South, Range 11 East Gila and Salt River Baseline and Meridian. This archaeological survey covers the entire 126-acre parcel located on the eastern portion of Ryan Airfield, north of Ajo highway, and east of the Ajo Highway/Valencia Road intersection. The proposed project is to construct drainage improvements within the southeast corner of the airport property to direct stormwater away from the operations area of Ryan Airfield. SWCA conducted the survey to aid the Tucson Airport Authority in complying with local cultural resources regulations and to aid the FAA and USACE in complying with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 Code of Federal Regulations Part 800) and the City of Tucson cultural resources regulations.

VI. AREA OF POTENTIAL EFFECTS (APE)/PROJECT AREA DESCRIPTION

The APE consists of 126 acres for the proposed drainage improvements project. Although the exact location of the improvements is yet to be determined, it would be contained entirely within this APE.

VII. PROJECT AREA INFORMATION

Total Acres: 126

NAD 83: Zone: 12

Meridian: Gila and Salt River

Justification for areas not surveyed (identify land jurisdiction): N/A

Project Location

Land Jurisdiction	Legal Description (T, R, Q, S)	Acres Surveyed	Acres Not Surveyed
City of Tucson	T15S, R12E, NE¼; SE¼; NW¼; SW¼, Sec. 7; T15S, R11E, SE¼	126	–

VIII. INVENTORY CLASS COMPLETED

☐ Class I Inventory only

☒ Class III Intensive Field Survey (includes Class I inventory)

☐ Other: Identify and provide justification.

IX. CLASS III SURVEY PERSONNEL AND METHODS

Field Personnel

Project Principal Investigator: Suzanne Griset

Project Director/Field Supervisor: Eric Petersen

Crew: Heather West, Paul Rawson, and Maggie Evancho

Date(s) of Fieldwork: January 14–15, 2016; August 4, 2017

Methods & Area Surveyed

Linear Miles: N/A **Transect intervals:** N/A m apart **Coverage:** N/A (%)

Acres Block Survey: 126 **Transect intervals:** 20m apart **Coverage:** 100%

Site recording criteria used: Arizona State Museum (ASM)

Ground Surface Visibility: 70 percent

Integrity of Survey Area: Good

X. CULTURAL RESOURCES

☐ No cultural resources identified

☒ Isolated occurrences only; Number of IOs recorded: 10

☒ Archaeological sites present; site summary table attached

Number of Previously Recorded Sites: N/A

Number of Newly Recorded Sites: 2 (AZ AA:16:612[ASM] and AZ AA:16:613[ASM])

Number of Sites Not Re-located: N/A

☐ Historic period buildings/structures etc. documented/evaluated; historic property inventory forms attached

RECOMMENDATIONS

Recommended Finding of Project Effect

☐ No Historic Properties Affected

☒ No Adverse Effect

☐ Adverse Effect

Final Draft Report Reviewed By (Consultant):

Reviewer's Name	Title	Years Experience
Suzanne Griset, Ph.D.	**Principal Investigator**	**40**

CONSULTANT CERTIFICATION

I certify the information provided herein has been reviewed for content and accuracy and all work meets applicable agency standards.

August 25, 2017

_____ _____

Signature *Date*

Principal Investigator

_____

Title

Site Management Summary[1]

Site Number	Newly/ Previously Recorded[2]	Land Jurisdiction	Legal Description (T, R, Q, S)	Datum UTMs	Site Type	Cultural/Temporal Affiliation	Eligibility Status[3] Criterion/Criteria	Treatment Recommendation(s)
AZ AA:16:612(ASM)	Newly	City of Tucson	T15S, R12E, SW¼, Sec. 7	484872E, 3555906N	Artifact Scatter	Euro-American/Historic	Not eligible	No further work
AZ AA:16:613(ASM)	Newly	City of Tucson	T15S, R12E, SW¼, Sec. 7	484637E, 3555918N	Artifact Scatter	Euro-American/Historic	Not eligible	No further work

[1]For FCC projects, distinguish between sites within the direct and visual APE.

[2.] Include sites previously recorded but not re-located during current survey.

[3]Recommended by recorder; Determined by SHPO or Agency.

PROJECT DESCRIPTION

SWCA Environmental Consultants (SWCA) was subcontracted by C&S Engineers, Inc., to complete an archaeological survey for the Tucson Airport Authority Ryan Airfield Drainage Improvements Phase I Project, located in Pima County, Arizona. The project area consists of approximately 100 acres in Section 7, Township 15 South, Range 12 East; Section 12, Township 15 South, Range 11 East Gila and Salt River Baseline and Meridian. This archaeological survey covers the entire 126-acre parcel located on the eastern portion of Ryan Airfield, north of Ajo highway, and east of the Ajo Highway/Valencia Road intersection. The proposed project is to construct drainage improvements within the southeast corner of the airport property to direct stormwater away from the operations area of Ryan Airfield. SWCA conducted the survey to aid the Tucson Airport Authority in complying with local cultural resources regulations and to aid the Federal Aviation Administration (FAA) and U.S. Army Corps of Engineers (USACE) in complying with Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 Code of Federal Regulations Part 800) and with the City of Tucson cultural resources regulations.

The area of potential effects (APE) consists of 126 acres for the proposed drainage improvements project. Although the exact location of the improvements is yet to be determined, it would be contained entirely within this APE.

PROJECT LOCATION

The project is located southwest of the city of Tucson, south of the Tucson Mountains, in the upper Avra Valley in Pima County (Figure 1). It is in Section 7, Township 15 South, Range 12 East; 12 East; Section 12, Township 15 South, Range 11 East in Tucson, Pima County, Gila and Salt River Baseline and Meridian, on the U.S. Geological Survey (USGS) Brown Mountain, Arizona, 7.5-minute quadrangle (Figure 2). SWCA surveyed a total of 126 acres of land owned and administered by the City of Tucson.

PREVIOUS RESEARCH

Archaeological Records Search

Before fieldwork, SWCA consulted the AZSITE database to identify previously conducted surveys and previously recorded sites in the project area and within a 1-mile radius of the project area.

The records search showed that 24 archaeological projects have been conducted in or within 1 mile of the project area (Table 1, Appendix A). None of these surveys have overlapped the current project area. These surveys were conducted for airport and road expansions, development, and infrastructure improvements.

Eight archaeological sites have been identified within a 1-mile radius of the project area (Table 2; see Appendix A). None of these sites are within the current project area. Three of the eight sites consist of prehistoric artifact scatters, some with associated features. Three sites are historic manifestations that consist of an artifact scatter, a habitation with associated artifacts, and the in-use historic State Route 86. One site is a multi-component site consisting of prehistoric and historic artifacts and associated features and one site is newly recorded and no information in AZSITE.

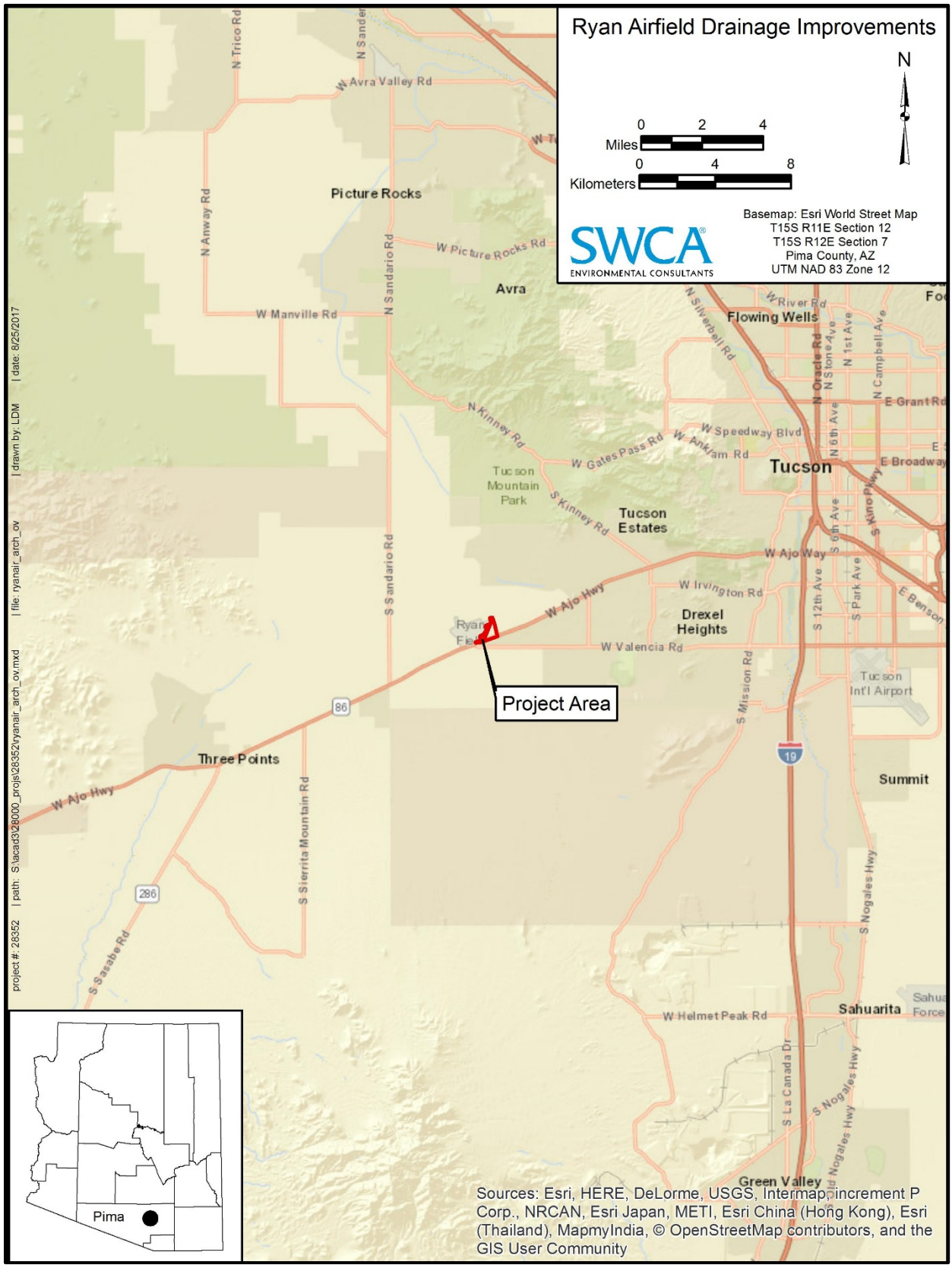


Figure 1. Project vicinity.

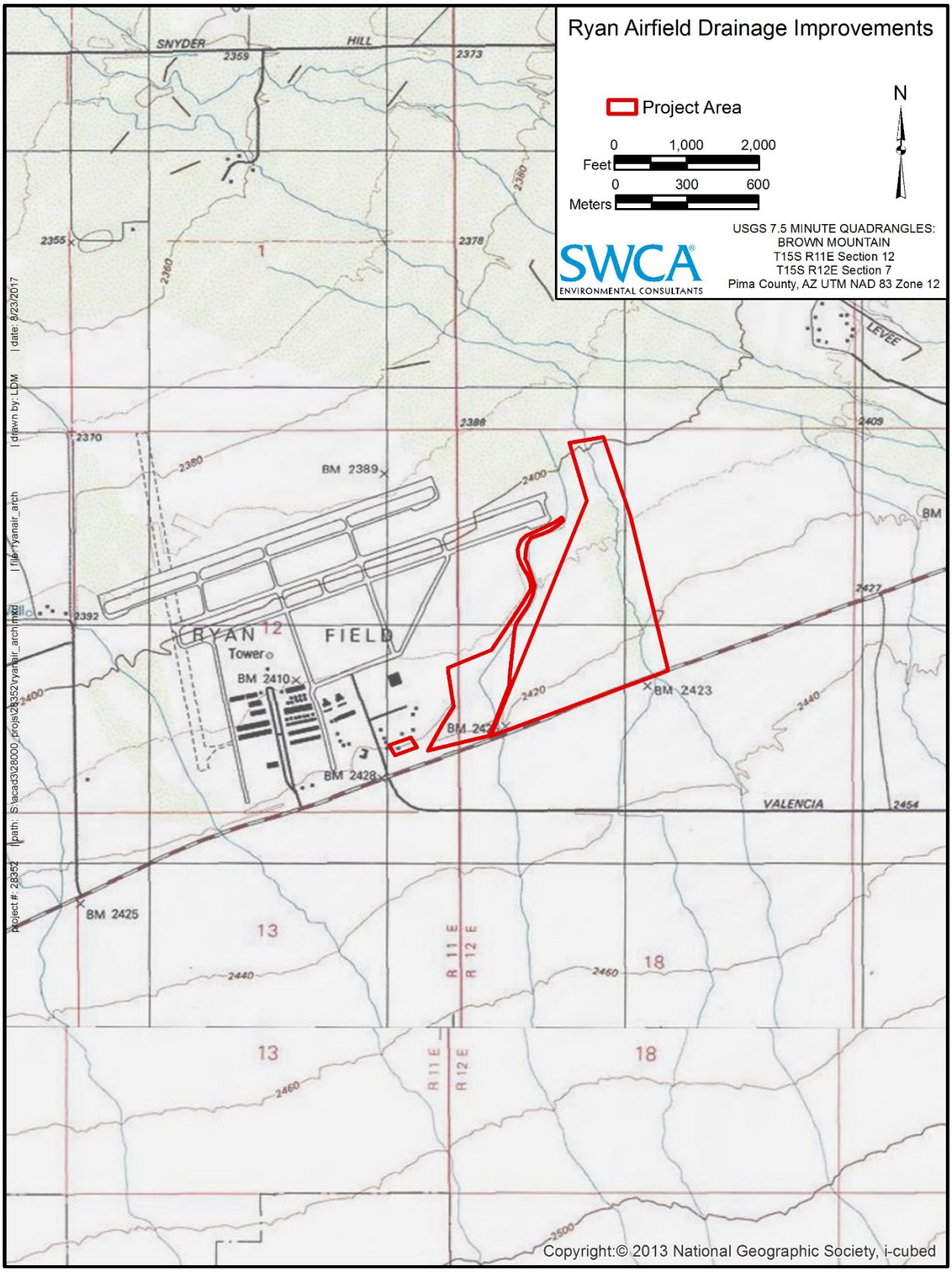


Figure 2. Project location.

Table 1. Previously Conducted Archaeological Surveys within a 1-Mile Radius of the Project Area

Agency Number	Project Name	Report Reference
1975-14.ASM	Avra Valley–Ryan Field	Project registration missing in AZSITE
1975-15.ASM	Brawley Wash–Robles Junction	Project registration missing in AZSITE
1986-109.ASM	Tucson Aqueduct Project–Phase B	Seymour (1986)
1986-162.ASM	Archaeological Survey along Why-Tucson Highway (SR 86)	Ervin (1986)
1988-92.ASM	Valencia Road Survey	Maldonado (1988a)
1988.218.ASM	Valencia Road Survey	Maldonado (1988b)
1989-184.ASM	Coffman Associates-Ryan Airfield	Euler (1989)
1994-326.ASM	Ryan Field Survey	Freeman (1994)
1996-428.ASM	Fiesta 2 Survey	Tompkins (1996)
1999-85.ASM	Three Points to Kinney Road Pavement Preservation Project	Hill and Bruder (1999)
2001-90.ASM	W.O. HYX-662, Ryan Field County Park Cultural Resources Assessment	Wyman and Dart (2001)
2002-4.ASM	Picture Rocks/Sandario to Valencia/Camino de Oeste Survey	Jones and Dart (2002)
2003-368.ASM	Sonoran Archaeological Survey	Sayre (2002)
2003-385.ASM	Closed Landfill Assessment CTA-79	Brack (2003)
2003-1368.ASM	TEP ASLD Survey	Harrison and Hesse (2003)
2003-1458.ASM	Sonoran Ranch Estates II	Stephen (2003)
2004-1725.ASM	Valencia Road and Ajo Way Survey	Craig (2004)
2005-292.ASM	Sonoran Estates II Easement: Section 7	Project registration missing in AZSITE
2005-479.ASM	Valencia and Valhalla Roads Survey	Hopkins (2004)
2006-942.ASM	Pomegranate II Farms Survey	Howell (2006)
2011-130.ASM	Tucson Trap and Skeet Shooting Range Expansion	Rawson (2011)
2011-242.ASM	TEP Ryan Line EA	Barr (2010)
BLM-16-21	Silver Bell Planning Unit A-10840	Unknown
SHPO-2002-135	Cultural Resources Survey of 0.5-Mile Right-of-Way	Rieder (2001)

Table 2. Previously Recorded Archaeological Sites within a 1-Mile Radius of the Project Area

Site Number	Site Type	Cultural/Temporal Affiliation	Eligibility Status
AZ AA:16:5(ASM)	Lithic scatter: Ed Hill Site	Native Archaeological Culture/Prehistoric	Not evaluated (recorder)
AZ AA:16:377(ASM)	Transportation: State Route 86	Euro-American/Historic	Determined eligible (SHPO)
AZ AA:16:458(ASM)	Artifact scatter with associated features	Hohokam/Ceramic Euro-American/Historic	Determined eligible (SHPO)
AZ AA:16:584(ASM)	Habitation with associated artifacts	Euro-American	Not considered eligible (recorder)
AZ AA:16:585(ASM)	Artifact scatter with associated features	Hohokam/Ceramic	Considered eligible (recorder)
AZ AA:16:586(ASM)	Artifact scatter	Euro-American	Not considered eligible (recorder)
AZ AA:16:589(ASM)	Artifact scatter	Hohokam/Ceramic	Considered eligible (recorder)
AZ AA:16:595(ASM)	Unknown	Unknown	Unknown

National Register of Historic Places–Listed Properties

The National Park Service's National Register of Historic Places database was searched to identify properties listed in the National Register of Historic Places (NRHP) that are located in or within 1 mile of the project area. No NRHP-listed properties were identified within the search area.

Historic Map Research

Historical maps were consulted to identify historic-era properties that were present, and may still be present, in the search area.

The General Land Office (GLO) map of Township 15 South, Range 12 East, filed in 1919, shows two roughly east-west-trending roads in the S ½ of Section 7 (Figure 3). The GLO map of Township 15 South, Range 11 East, filed in 1888 shows one of the same roads in the southeast corner of 12. The 1955 GLO Dependent Resurvey and Subdivision map for Section 7 depicts the AJO TO TUCSON HIGHWAY in the S ½ of Section 7. This road is at a similar alignment with one of the roads depicted on the 1919 GLO. No other historical structures, farm fields, ranches, roads, or other facilities are shown in the immediate vicinity of the project area.

The 1943 USGS San Xavier Mission, Arizona, 15-minute quadrangle was examined. No historical structures are shown the project area. The AJO TO TUCSON HIGHWAY is depicted south of the current project area. The 1957 USGS San Xavier Mission, Arizona, 15-minute quadrangle was also examined. The map depicted the Ryan Field in Section 12 and five TOWERS in the SW ¼ of Section 7. No other historical structures are depicted.

PHYSIOGRAPHIC CONTEXT

The proposed Ryan Airfield Drainage Improvements Phase I Project area is located in the upper Avra Valley. The Avra Valley is a broad, north-draining alluvial basin that is bounded on the east by the Tucson Mountains, on the west by the Roskruge, Waterman, and Silver Bell Mountains, and on the south by the Sierrita Mountains. Brawley Wash is the axial drainage of the Avra Valley, ultimately flowing into and forming Los Robles Wash, a tributary of the Santa Cruz River. The project area is located in undeveloped desertscrub east of the existing Ryan Airfield infrastructure (Figures 4 and 5). Tucson Mountain Park is approximately 3.5 miles north of the project area, and the Roskruge Mountains are approximately 5 miles northwest of the project area. Vegetation within the project area is relatively undisturbed with the exception of several existing roads and fences, a berm, and the northern part of the project area, which extends east of the runway, which has already been cleared. Several ephemeral washes bisect the project area running north-south. A portion of the project area contained water from recent rains during the two days of the archaeological survey. Surface sediments are Tubac sandy loam, which consist of mixed alluvium on basin floors and fan terraces that generally consist of light brown deposits with small gravels. Elevations in the project area range from approximately 2,400 to 2,426 feet above mean sea level (amsl).

The project area is an ecotonal zone between the semidesert grassland and the Arizona upland subdivision of Sonoran desertscrub (Brown 1994). The dominant vegetation within uplands in the project area consists of triangle bur ragweed (*Ambrosia deltoidea*), Arizona pencil cholla (*Cylindropuntia arbuscula*), jumping cholla (*C. fulgida*), Christmas cactus (*C. leptocaulis*), walkingstick cactus (*C. spinosior*), pinkflower hedgehog cactus (*Echinocereus fasciculatus*), button brittlebush (*Encelia frutescens*), candy barrelcactus (*Ferocactus wislizeni*), threadleaf snakeweed (*Gutierrezia microcephala*), creosote bush (*Larrea tridentata* var. *tridentata*), water jacket (*Lycium andersonii*), Fremont's desert-thorn (*L. fremontii*), Thornber's fishhook cactus (*Mammillaria thornberi*), cactus apple (*Opuntia engelmannii*),

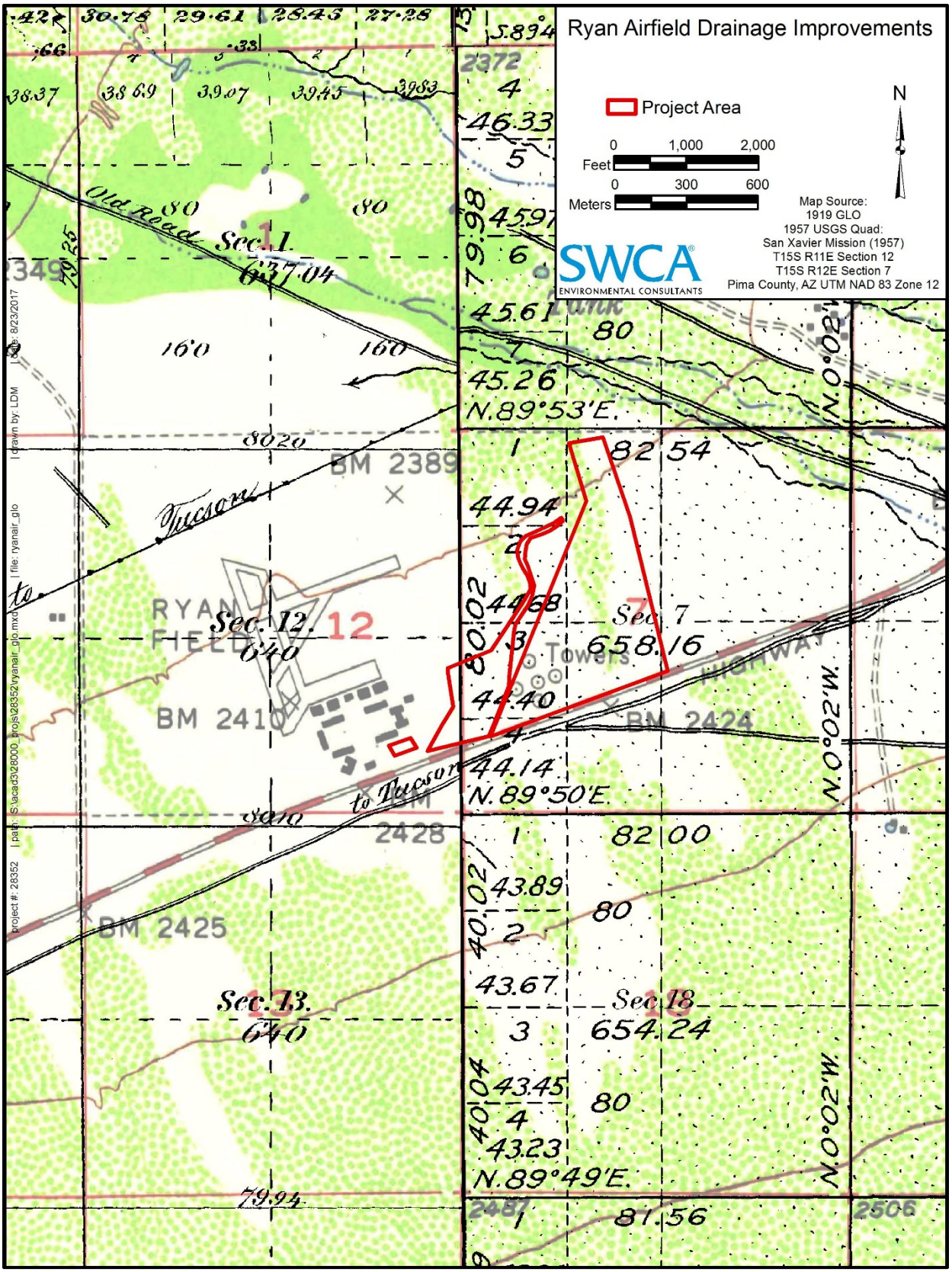


Figure 3. Historic map research of the project area.

Figure 4. Overview of project area, facing northwest.

Figure 5. Overview of project area, facing southwest.

purple pricklypear (*O. macrocentra*), Santa Rita pricklypear (*O. santa-rita*), velvet mesquite (*Prosopis velutina*), whitethorn acacia (*Vachellia constricta*), and lotebush (*Ziziphus obtusifolia*). Grasses commonly encountered included purple threeawn (*Aristida purpurea*), spidergrass (*A. ternipes*), Bermudagrass (*Cynodon dactylon*), Arizona cottontop (*Digitaria californica*), stinkgrass (*Eragrostis cilianensis*), Lehmann lovegrass (*E. lehmanniana*), bush muhly (*Muhlenbergia porter*), buffelgrass (*Pennisetum ciliare*), and large-spike bristlegrass (*Setaria macrostachya*). Dominant vegetation along the drainages included flatspine bur ragweed (*Ambrosia acanthicarpa*), ambrosia leaf bur ragweed (*A. ambrosioides*), desertbroom (*Baccharis sarothroides*), spiny hackberry (*Celtis ehrenbergiana*), Jerusalem thorn (*Parkinsonia aculeata*), blue paloverde (*P. florida*), yellow paloverde (*P. microphylla*), velvet mesquite, and whitethorn acacia.

Other plants observed include carelessweed (*Amaranthus palmeri*), bristly fiddleneck (*Amsinckia tessellate*), fourwing saltbush (*Atriplex canescens*), desert marigold (*Baileya multiradiata*), fewflower beggarticks (*Bidens leptocephala*), spiderling (*Boerhavia* sp.), hoary bowlesia (*Bowlesia incana*), Asian mustard (*Brassica tournefortii*), saguaro (*Chamaesyce* sp.), goosefoot (*Chenopodium* sp.), Canadian horseweed (*Conyza canadensis*), fingerleaf gourd (*Cucurbita digitata*), pricklyburr (*Datura inoxia*), western tansymustard (*Descurainia pinnata*), New Mexico silverbush (*Argythamnia neomexicana*), longleaf jointfir (*Ephedra trifurca*), buckwheat (*Eriogonum* sp.), redstem stork's bill (*Erodium cicutarium*), slender janusia (*Janusia gracilis*), shaggyfruit pepperweed (*Lepidium lasiocarpum*), rose bladderpod (*Lesquerella purpurea*), tanseyleaf tansyaster (*Machaeranthera tanacetifolia*), Graham's nipple cactus (*Mammillaria grahamii*), desert tobacco (*Nicotiana obtusifolia*), evening primrose (*Oenothera* sp.), mesquite mistletoe (*Phoradendron californicum*), desert Indianwheat (*Plantago ovata*), unicorn-plant (*Proboscidea* sp.), prickly Russian thistle (*Salsola tragus*), Arabian schismus (*Schismus arabicus*), London rocket (*Sisymbrium irio*), silverleaf nightshade (*Solanum elaeagnifolium*), common sowthistle (*Sonchus oleraceus*), desert globemallow (*Sphaeralcea ambigua*), lyreleaf jewelflower (*Streptanthus carinatus*), woolly tidestromia (*Tidestromia lanuginosa*), and desert zinnia (*Zinnia acerosa*). Nonnative species observed included Arabian schismus, Asian mustard, Bermuda grass, buffelgrass, Lehmann lovegrass, London rocket, prickly Russian thistle, and redstem stork's bill.

CULTURE HISTORY

Pre-Hohokam (ca. 12,500 B.C.–ca. A.D. 650)

The earliest known human occupation of southeastern Arizona is associated with the Paleoindian period (9500–8000 B.C.). The most commonly recognized artifacts from this period are large projectile points, such as those of the Clovis and Folsom traditions. A significant number of Paleoindian sites are in southeastern Arizona, including some of the better-studied Clovis culture sites in the New World. Aside from a few projectile points, there is no substantial evidence of Paleoindian occupation in the Tucson Basin. This may be because the area was not attractive to Paleoindian peoples, or, more likely, because the sites have become either deeply buried or destroyed by natural geological processes (Huckell 1984). Clovis points curated by later peoples have occasionally been recovered from younger, Hohokam contexts at sites near Tucson (Barr 2009; Doelle 1985).

The extinction of many species of Pleistocene big-game animals and the development of plant milling technology marked the origin of Archaic culture in the region (Sayles 1983; Sayles and Antevs 1941).

With the recent discovery of early maize farming in the region, largely studied in the Tucson Basin and nearby Cienega Valley, the Late Archaic period has been relabeled the Early Agricultural period (Huckell 1995, 1996). Formerly, this period was known simply as the Late Archaic or, for southeastern Arizona, the San Pedro phase of the Cochise culture.

Large-scale excavations along the Tucson Basin reach of the Santa Cruz River (e.g., Mabry 1998) have revolutionized the archaeological community's understanding of this period. Previously, Late Archaic people were viewed as living in small, kin-based bands, practicing a foraging strategy and moving from place to place as they followed a seasonally scheduled subsistence round. Now, we know that the bulk of the population probably lived in substantial villages, for at least part of each year, and adopted floodplain maize farming from societies living far to the south in the Valley of Mexico.

At riverine habitation sites, the discovery of abundant marine shell from the Gulf of California and California coasts informs archaeologists that these people made very long expeditions to obtain the shell or participated in a very large-scale, supra-regional trade network. Roth (1995), however, demonstrates that Early Agricultural residents of the Tucson Basin also continued to exploit non-riverine habitats. A number of investigated sites on the upper bajadas of the Tucson, Tortolita, and Santa Catalina Mountains were the focus of short-term, wild-food gathering and processing activities. Although occupations were short-term, the sites were often occupied repeatedly and have included substantial material culture remains, including human burials (Dart 1986).

The Early Ceramic period in the Tucson Basin, ca. A.D. 150–650, is characterized by the local development of plain ware pottery. Early researchers suspected that the Hohokam culture was the result of a large-scale migration to an "empty niche" in the middle Gila River area from what is now western Mexico (Haury 1976). Recently available evidence of a large Early Agricultural and Early Ceramic period population in the northern Sonoran Desert, however, has led researchers to hypothesize an in situ development.

Hohokam (ca. A.D. 650–1450)

The pre-Classic Hohokam village-dwelling farmers of the northern Sonoran Desert are best characterized by their participation in a widespread religious ideology (Wallace et al. 1995). This ideology was principally expressed by participation in a Mesoamerican ball game and a cremation funerary complex. Ball courts are found at major Hohokam village sites and mark the population centers and social foci of the Hohokam world (Wilcox 1991). Cremation cemeteries are associated with specific house clusters within villages, which suggests the presence of kinship lineage–based social organization.

In the Tucson Basin, a patently Hohokam culture emerged by A.D. 800 (Wallace et al. 1995). By the Rincon phase, beginning ca. A.D. 950, the local pottery style was markedly different from that made in the middle Gila River area to the north. The implication is that pottery and potters consistently moved between these areas in earlier times, transferring style, but not so in the Rincon phase and later times. Also at about this time, food production was diversified by innovative use of the landscape. Specifically, in addition to irrigation farming along the Santa Cruz River and major tributaries, some segments of the local population began floodwater farming along minor washes and dry farming the bajada slopes. Rather than suggesting that a segment of the local population was forced to subsist in marginal, water-poor areas, this suggests that a large, cooperating population was diversifying food production as an adaptive strategy. Localized disasters could be mitigated by food transfer from unaffected groups to the victims of crop failure in a social system of reciprocity. The evolution of a diversified, cooperative food production strategy was experienced throughout the Hohokam world in the late pre-Classic and the Classic periods.

The Classic period is marked by the abandonment of the ball game, an increasing preference for inhumation rather than cremation burial, and development of adobe architecture. Many pre-Classic communities were abandoned, and new, larger communities were established. A new religious ideology, including the construction of platform mound monuments, was initiated. By the end of the Classic period, Hohokam villagers had built more than 100 platform mounds in the northern Sonoran Desert region. Pre-Classic period architectural antecedents were plaster-capped earth piles enclosed with timber palisades

and topped by jacal superstructures. The Classic period Hohokam developed this architecture into adobe-walled, room-like cells filled with cobbles and earth with adobe room-block superstructures. These monuments were built in select multi-room, adobe-walled compounds. These compounds were situated strategically in the largest villages, at regular intervals along canal systems, and housed sizable storage facilities (Gregory and Nials 1986). Trash at sites with platform mounds reflects greater access to rare commodities (Bayman 1992). They were likely ceremonial facilities, elite residences, and places of political authority.

Proto-Historic Period (A.D. 1492–1692)

At the end of the Classic period, the Hohokam social and economic structure seems to have collapsed. As documented by the first Spanish explorers of the region, local populations reverted to less intensive patterns of land use. The local O'odham continued a very Hohokam-like subsistence strategy in the Tucson Basin (Castetter and Bell 1942) and occupied villages along the Santa Cruz River when explorer-priest Kino and company arrived in the 1690s (Bolton 1936; Seymour 2011). The Spanish colonists who followed established several missions near existing O'odham villages along the length of the Santa Cruz River Ultimately, the Santa Cruz Valley became dominated by Spanish and Mexican families who lived by farming, ranching, and trade.

Historic Period (A.D. 1693–1953)

The Historic period in the Tucson Basin can be divided into a Spanish/Mexican period (A.D. 1699–1854) and an American period (A.D. 1854–1950)—the terms Spanish, Mexican, and American referring to political hegemony rather than ethnic identity (Ayres 1984). Spanish colonization of what is now known as southern Arizona began in the 1690s with the travels of the Jesuit missionary Eusebio Francisco Kino. Kino first traveled as far north as the Tucson Basin in 1692 and 1694 (Doelle 1984). The mission at San Xavier del Bac in the southern Tucson Basin was established under Kino's influence in 1700. Father Kino established missions at Tumacacori and Tubac in 1691. The 1751 Pima Indian Revolt destroyed the Tubac settlement, and the Presidio San Ignacio de Tubac was established in 1752 to protect the Spanish colonists in Tubac. In 1775, a presidio was established in Tucson to protect the missions at San Xavier and San Agustín from Apache attack (Harry and Ciolek-Torrello 1992). The Santa Cruz River from Nogales to its confluence with the Gila River is part of the Juan Bautista de Anza National Historic Trail, which recognizes the 1775–1776 expedition led by Juan Bautista de Anza from Sonora, Mexico, to the San Francisco Bay area of California that resulted in the Spanish colonization of San Francisco (Garate 1994). The expedition, consisting of 240 persons, arrived in the San Francisco Bay area on March 27, 1776.

Small numbers of Spanish/Mexican settlers populated the Santa Cruz Valley during the Spanish colonial period, establishing herds of range cattle and mining in the hills around Arivaca. Settlement slowed after Mexican independence, when funding and supplies largely ceased to reach the missions and presidios guarding the frontier, and the threat of Apache attack was renewed (Clemensen 1987; Harry and Ciolek-Torrello 1992; Sheridan 1995).

The American period (1854–1945) began with the Gadsden Purchase, when southern Arizona became U.S. territory in 1854. The Homestead Act of 1862 provided for the conversion of federal land to small, private holdings and promoted American settlement of Arizona, along with the rest of the western United States (Stein 1990). Settlement was constantly disrupted until the 1880s, however, by warfare with Apache bands. As a result, the U.S. military manned a number of posts in the area: El Reventon (1862 and 1864), Camp/Fort Lowell (1860–1890), Camp Tucson (1860–1861), Camp Tubac (1864), and Camp Cameron (1866).

For 7 years (1910–1917), the Mexican revolution raged just across the international border approximately 20 miles (32 km) south of Tubac. In 1912, the Arizona Territory was made a state. The Santa Fe Pacific Railroad Company acquired Santa Cruz Valley rights-of-way in 1915, and U.S. participation in World War I (1917–1918) created a bull market for the principal products of the Santa Cruz River valley: cattle, copper, cotton, and horses. The new access to railroad transportation positioned Tubac-area residents to take advantage of the good market conditions.

The Stock Raising Homestead Act (1916) fostered the settlement of non-irrigable land. During the Great Depression (1929–ca. 1939), settling such marginal land became a more attractive economic activity (Stein 1988, 1990). In areas like the Santa Cruz River valley, these factors promoted ranching endeavors on the bajadas or mountain skirts. Some cattlemen vehemently opposed fencing the free range for small homesteads, however, which may have created hostile relationships.

Arizona was granted statehood in 1912, bringing many improvements in transportation, education, and agriculture to the region. Developing industries led to ever-larger numbers of Euro-Americans moving through and into the Tucson Basin during the American period. The discovery of precious metals in southern Arizona led to a mining boom. Transportation across the area increased and changed from horse trails to wagon routes, and then to railroads and automobile thoroughfares. Government legislation and improved transportation routes linked southern Arizona with the rest of the United States, leading to a rise in the variety of activities carried out in the region.

The development of the railroad brought even more people to southern Arizona. Although the first American railroad began operating in 1827, it took nearly 20 years for rail to become the predominant form of transportation. By the mid-1850s, Congress had recognized the need for a transcontinental railroad. However, because of the magnitude of such an operation, it took until the 1880s for the line to reach southern Arizona. Before that time, Tucson remained isolated economically since all goods were brought to the area by oxen or mule. The railroads made it easier, faster, and cheaper to transport freight and people (Sheridan 1995). This brought many changes to Tucson, including a stronger economy, a larger population, a more diverse mix of people with the influx of Chinese railroad workers, and the beginnings of a tourist industry (Sheridan 1995).

Ford's invention of the Model T further changed the landscape of southern Arizona, leading to a rise in automobile ownership and eventual road improvements. Only a handful of automobiles existed in southern Arizona before Ford's development of the Model T and the production line. In 1900, 8,000 automobiles were owned in this country, rising to 10,000 by 1910. However, by 1920, the total number of automobiles owned in the country had risen to 8 million; this number had skyrocketed to 23 million by 1930. The rise in automobile ownership led to a need for better roads on which to travel. The first roads for automobiles were not paved; such projects did not begin until the 1930s. These early roads continued to be the two-track dirt roads, graded dirt roads, and graveled roads of earlier wagon travel (Keane and Bruder 1999).

The next suite of major changes came with U.S. entry into World War I (WWI) in 1917. The war demand for cotton was met primarily by farms in the Salt River valley, but farmers along the Santa Cruz River also benefited from the cotton boom (Sheridan 1995:211–213). WWI influenced mining, when the demand for copper rose in response to weapons manufacturing. Many mining districts, such as the Ajo District, began large-scale production at the start of the war (Wilson 1949:5–6). Production declined after the end of the war, however. WWI highlighted the need for good roads, and with the growth of private automobile ownership in the 1920s, Arizona levied its first gasoline tax in 1921 (Hall 1972:224).

Following WWI, tourism grew along with Arizona's reputation for a healthful climate. Sanatoriums and schools were built for tuberculosis patients, many of them WWI veterans. As early as 1913, ancient ruins were advertised as tourist attractions. The dude-ranch industry arrived in the 1920s (Whittlesey et al. 1994).

The Great Depression halted economic prosperity in other areas, however, severely affecting farming, ranching, and mining, the latter nearly disappearing. Civilian Conservation Corps and Works Progress Administration workers built roads, bridges, and other facilities that enhanced recreational sites.

U.S. participation in World War II (1941–1945) contributed to national economic recovery and, like U.S. participation in World War I, created better market conditions for ranching, farming, and mining operations in the Santa Cruz River valley. A more enduring impact was urban growth, including that of fledgling desert cities.

Mining saw a second boom during World War II (WWII). Military installations such as Davis-Monthan Air Force Base in Tucson, Fort Huachuca in Sierra Vista, and the Barry M. Goldwater Air Force Range centered in Phoenix (and was then called Luke Field) also expanded greatly during the war. After the attack on Pearl Harbor, the federal government began to realize the need for a large number of trained pilots. With the fear of coastal attack spurred by Pearl Harbor, inland training sites were preferred, and Arizona's clear weather was ideal. Pilot-training centers were established at Marana Army Air Field and Ryan Field to address this need (Henry 1992).

Construction for Ryan Airfield started on June 15, 1942, in the open desert southwest of Tucson, on the north side of the major route between Tucson and Sells, the Tohono O'odham capital. It took just three months to construct the Army Airfield. The Ryan School of Aeronautics included paved runways, apron, hangars, barracks, mess hall, maintenance shop, classrooms, offices, a PX, and recreational facilities (Coffman Associates Inc. 2010). The school closed on September 5, 1944, with 6,000 graduated pilots. Because of the critical need for pilots, the full 4-month course of flight instruction was compressed to 9 weeks.

At the end of WWII, the U.S. government was left with numerous surplus airports that were transferred to state and local jurisdictions under the War Surplus Property Act of 1944. Ryan Airfield, including all improvements, was transferred to the State of Arizona on October 4, 1948 (Coffman Associates Inc. 2010).

On August 1, 1951, the State executed a 10-year lease agreement with the Tucson Airport Authority for the 906-acre airport, ending a 6-year period of dormancy. Within 3 weeks of operation, five buildings were leased to two tenants. The short-term lease prohibited new tenants from improving the airfield. However, in 1954, a new 99-year lease was executed. The State ultimately transferred ownership of the airport by quit claim deed to the City of Tucson on December 16, 1960. Since that time, Ryan Airfield has experienced a significant expansion of general aviation facilities (Coffman Associates Inc. 2010).

SURVEY METHODS

Resource Definitions

Archaeological resources were evaluated according to criteria established by the Arizona State Museum (ASM). The criteria recognize two classes of archaeological remains: the site and the isolated occurrence (IO). The archaeological site is defined under rules adopted for the administration of the Arizona Antiquities Act:

> "Archaeological site" means any area with material remains of past Indian or non-Indian life or activities that are of archaeological interest, including without limitation, historic or prehistoric ruins, burial grounds, and inscriptions made by human agency. (Arizona Antiquities Act, Arizona Revised Statutes 41-841, *et seq.*, Chapter 8-201, A.3)

As interpreted by the ASM, "remains of archaeological interest" may include "purposeful constructions" or simply concentrations of materials more than 50 years old. Additionally, sites should consist of at least one of the following:

> 30+ artifacts of a single class (i.e., 30 sherds, 30 tin cans) within an area 15 meters (50 feet) in diameter, except when all pieces appear to originate from a single source (i.e., one ceramic pot, one core, one glass bottle);
>
> 20+ artifacts which include at least 2 classes of artifact types (i.e., sherds, groundstone, nails, glass) within an area 15 meters (50 feet) in diameter;
>
> One or more archaeological features in temporal association with any number of artifacts;
>
> Two or more temporally associated archaeological features without artifacts.
>
> Non-linear, isolated features without associated artifacts may be recorded at the discretion of the archaeologists. An "isolated feature" is defined as a feature that does not have any other features within a 100 meter (325 feet) diameter. This might include isolated rock piles, mine shafts, prospecting pits or unidentified depressions without associated artifact associations. (ASM 1995)

An archaeological occurrence meeting these minimum criteria is recorded as a site. An occurrence not meeting these criteria is generally classified as an IO, although under exceptional circumstances an occurrence may be judgmentally classified as a site.

Survey Coverage

SWCA archaeologists Eric Petersen, Paul Rawson, Heather West, and Maggie Evancho surveyed 126 acres of the project area on January 14–15, 2016 and the remaining 26 acres was surveyed by Eric Petersen on August, 4, 2017 resulting in a total of 8 person–field days. General conditions for the survey were excellent, and ground visibility was generally 70 percent.

The survey was conducted using standard archaeological techniques following ASM guidelines for survey coverage and site recording methodologies. According to the standards for pedestrian survey established by ASM, a person conducting a pedestrian survey can achieve 100 percent coverage of a parcel by walking a series of systematic transects spaced no more than 20 m (66 feet) apart. The survey entailed systematically walking the 126-acre project area in parallel transects spaced no more than 20 m apart.

The archaeologists sought evidence for cultural resources in the form of artifacts (e.g., ceramics, lithics, historical metals, or glass) or features (concentrations of fire-affected rock, charcoal-stained soil, prehistoric or historical structures, or other cultural anomalies). In addition to searching for archaeological remains, the archaeologists included in their survey in-use properties (e.g., buildings, roads, corrals) greater than 50 years old.

Once a site was identified, the crew then proceeded to mark the locations of artifacts and features with pin flags. Next, individual crew members began his or her assigned tasks. Tasks included completing the site form, conducting artifact inventories, completing feature descriptions, taking photographs, and mapping the site with a handheld global positioning system (GPS) unit. GPS data were reported in Universal Transverse Mercator (UTM) coordinates projected using the 1983 North American Datum (NAD 1983). No artifacts were collected.

Archaeological remains designated as IOs were point located and recorded using a handheld GPS unit. When culturally diagnostic or unusual items constituted IOs, they were photographed.

National and Arizona Registers Criteria for Evaluation

Four criteria are applied in the evaluation of cultural properties for inclusion in the NRHP (36 Code of Federal Regulations 60.4). The same criteria are used to evaluate properties for inclusion in the Arizona Register of Historic Places (ARHP) (Arizona Administrative Code Section R12-8-302). Normally, a significant property must be at least 50 years old and meet at least one of these four criteria to be considered eligible for listing in the NRHP/ARHP. According to the NRHP/ARHP criteria, the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguished entity whose components may lack individual distinction; or

D. that have yielded, or may be likely to yield, information important in prehistory or history.

SURVEY FINDINGS

The survey of the project area resulted in identification of two newly recorded archaeological sites and ten IOs (Figure 6). The two sites, AZ AA:16:612(ASM) and AZ AA:16:613(ASM), are historic artifact scatters. The nine IOs are primarily historic-era manifestations but also include a few prehistoric artifacts.

Sites

A description of the two sites and a discussion of their significance follow.

AZ AA:16:612(ASM)

Site Type: Artifact scatter with features

Cultural Affiliation: Euro-American

Temporal Affiliation: Late Historic (A.D. 1900–1966)

Dimensions/Area: 174 × 137 feet (19,9945 square feet) [53 × 41 m (1,853 m^2)]

Land Ownership: City of Tucson

Legal Description: Section 7, Township 15 South, Range 12 East, Pima County, on the USGS Brown, Arizona, 7.5-minute quadrangle

Location within Project Area: Within surveyed parcel

NRHP/ARHP Eligibility: Recommended ineligible

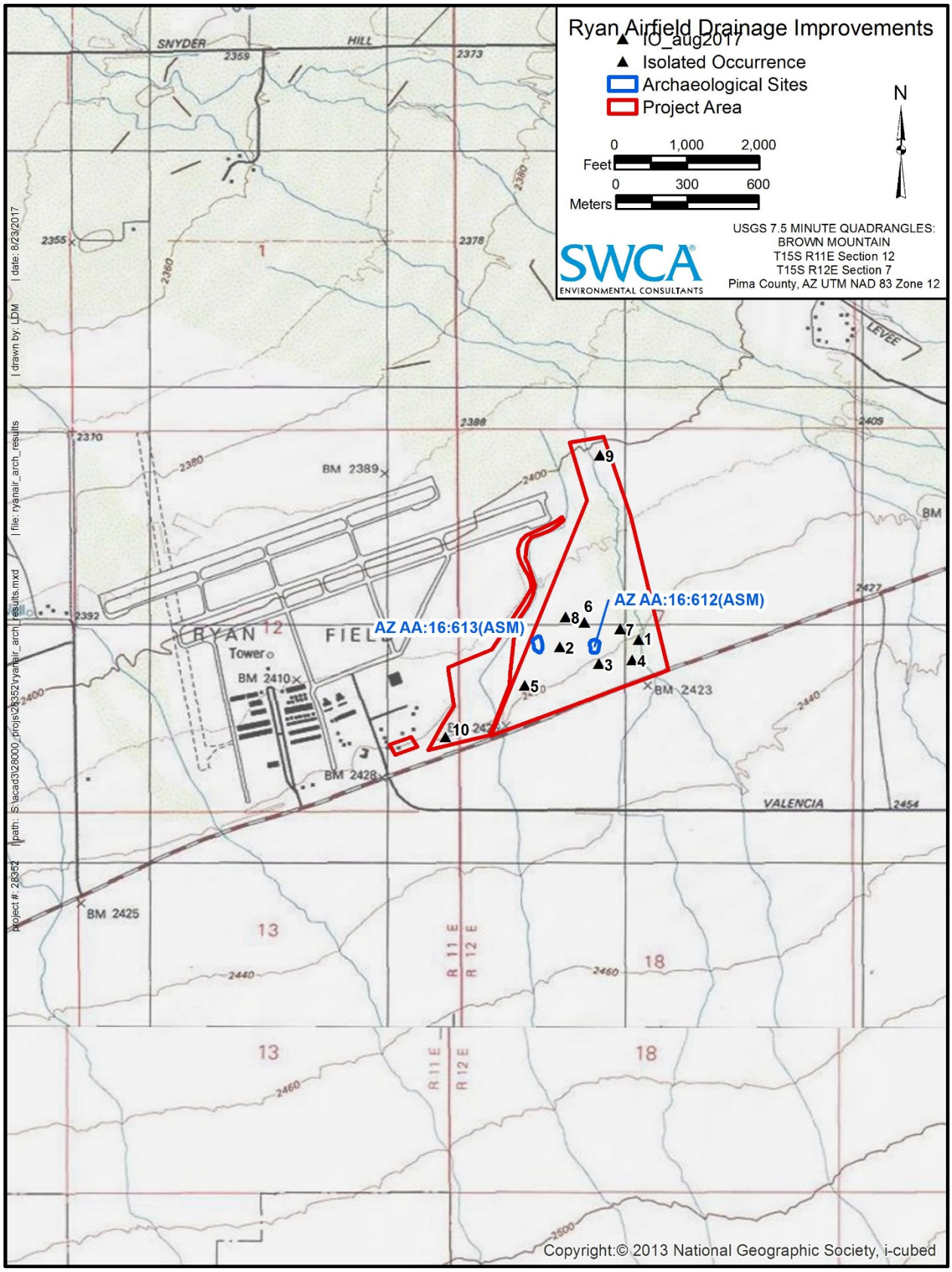


Figure 6. Results of current project.

Site Overview

AZ AA:16:612(ASM) is a low-density Historic period artifact scatter and two small features. The site measures 174 feet N-S × 137 feet E-W (53 × 41 m) and is located on relatively flat, open area (Figures 7 and 8).

Figure 7. Site overview; view facing north.

Features

Feature 1 is a 2 × 2–foot (0.6 × 0.6–m) horizontal concrete pad of unknown thickness, with FAA P and an arrow pointing north etched onto the surface of the pad (Figure 9). Feature 2 consists of two upright metal bolts embedded into the ground surface with approximately 4 inches (0.1 m) exposed above modern ground surface. The bolts are oriented north-south and are approximately 6 feet (1.8 m) apart (Figure 10).

Artifacts

At least 89 artifacts consisting of metal, glass, and ceramic fragments were observed at AZ AA:16:612(ASM). These included a machined nail, three metal bolts, one external friction can lid, three crushed sanitary cans, two wire fragments, one metal 55-gallon drum lid, one hole-in-cap meat can, and one metal hinge. Only one potentially diagnostic metal artifact was identified, consisting of a Type 12 matchstick filler can—a type produced from 1917 to 1929 (Simonis 1997). Two non-historic Budweiser beer cans with release buttons [push-tab] (mid-1970s) were also observed. The glass assemblage was ambiguous and consisted of 20 colorless glass fragments (1930–present) and one colorless bottle base with the maker's mark of a double circle. The ceramic assemblage consisted of 49 Protohistoric plain ware sherds likely from a single fragmented jar. Historic Papago water jars were used by native and non-native people in southern Arizona through the mid-twentieth century.

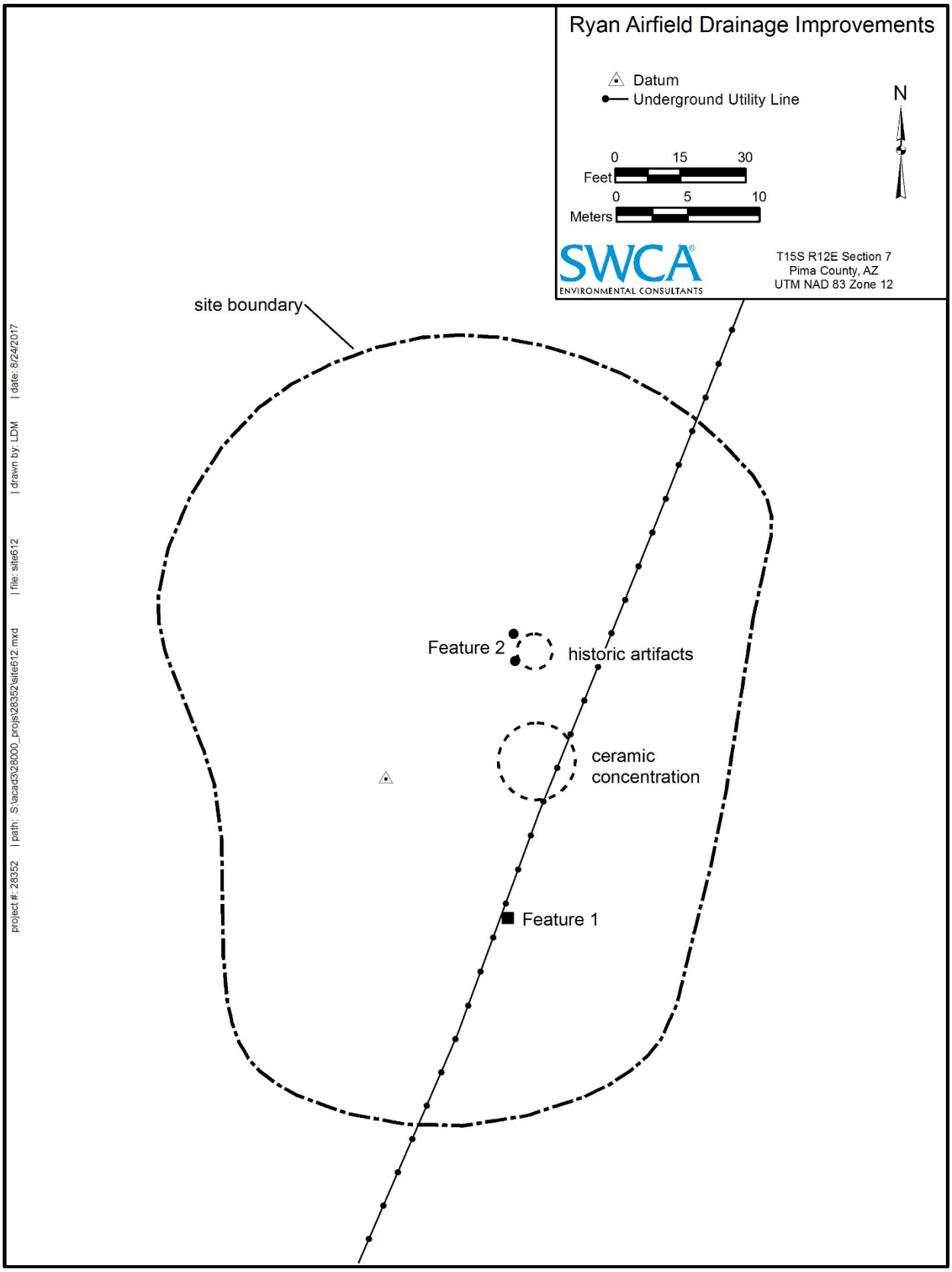


Figure 8. AZ AA:16:612(ASM) site map.

Figure 9. Feature 1 at AZ AA:16:612(ASM).

Figure 10. Feature 2 at AZ AA:16:612(ASM); view facing west.

Environmental Setting

AZ AA:16:612(ASM) is located on generally flat, open area roughly in the center of the project area. Surface sediments are tannish brown sandy loam with 60 percent small to medium-sized angular poorly sorted gravels. Vegetation includes mesquite, snakeweed, brittlebush, prickly pear, and various forbs. Surface visibility at the time of survey was 76 to 99 percent. Site elevation is 2,419 feet (737 m) amsl.

Site Condition

The site is in good condition. It has been minimally affected by rodent burrowing, minor sheet washing, and installation of an underground utility line. The site appears to be 51 to 75 percent intact, and buried cultural deposits are unlikely.

Interpretation and NRHP Eligibility

AZ AA:16:612(ASM) is a low-density historic artifact scatter with a small concrete pad and two upright bolts embedded in the modern ground surface. The diagnostic artifacts suggest a use of the site from 1917 to present. Based on the location of the site, the presence of the etched concrete pad, and the two embedded upright bolts, AZ AA:16:612(ASM) most likely is associated with the five radio towers that were depicted on the USGS 1957 San Xavier Mission, Arizona, 15-minute quadrangle. Additional map research (1969 San Xavier Mission, Arizona, 15-minute quadrangle) shows that the five radio towers were removed sometime before 1969 and replaced with a single radio tower. Currently, there is a non-directional beacon and a remote transmitter/receiver approximately 540 feet (164 m) west of site. Buried archaeological deposits, including features, are unlikely to be present. SWCA recommends that the site is ineligible for the NRHP/ARHP under Criterion D. Additional work at this site does not have the potential to provide additional important information on the historic use of the area.

AZ AA:16:613(ASM)

Site Type: Artifact scatter

Cultural Affiliation: Euro-American

Temporal Affiliation: Late Historic (A.D. 1900–1966)

Dimensions/Area: 215 × 115 feet (22,614 square feet) [65 × 35 m (2,101 m^2)]

Land Ownership: City of Tucson

Legal Description: Section 7, Township 15 South, Range 12 East, Pima County, on the USGS Brown, Arizona, 7.5-minute quadrangle

Location within Project Area: Within western portion of surveyed parcel

NRHP/ARHP Eligibility: Recommended ineligible

Site Overview

AZ AA:16:613(ASM) is a low-density historic artifact scatter. The site measures 215 feet N-S × 115 feet E-W (65 × 35 m) and is located in a relatively flat, open area (Figures 11 and 12).

Features

No features were identified.

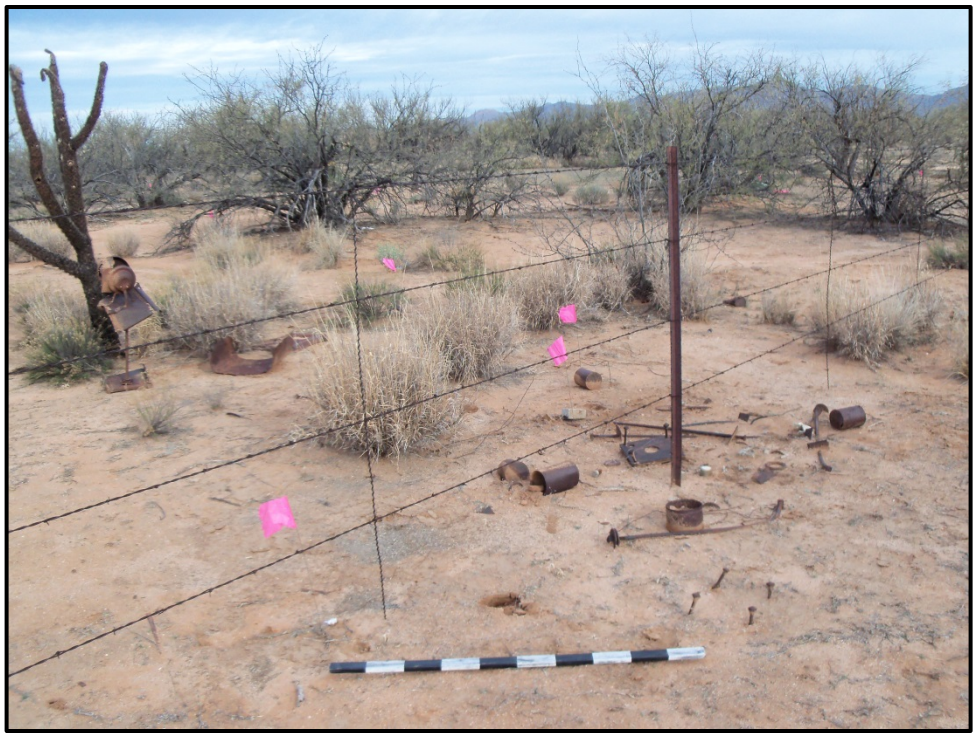


Figure 11. Site overview; view facing north.

Artifacts

At least 99 artifacts consisting of metal, glass, and concrete fragments were observed at AZ AA:16:613(ASM). Metal machine parts are located in a concentration in the southern portion of the site and scattered sparsely outside the concentration. They included two square metal plates bolted together, six 39-inch-long bolts with washers, one metal machine part with a riveted PURITAN NO. 22 tag (Figure 13), two unknown machine parts, two possible motor components with interlocking NC in a diamond on the end, 12 metal springs with machined bolt heads, one galvanized steel welded bracket, five sanitary cans, one external friction can, one metal spring, one metal gear, eight metal oil cans, one pipe fitting, one external friction can lid, two titanium caps filled with ceramic, seven terminal and various electronic bits, one metal basin/tray, five wire fragments, and one metal lid. The glass assemblage consisted of two large light bulbs (Figure 14), one milk glass jar fragment, one milk glass plate fragment, three fragments of colorless glass (1930–present), and one Anchor-Hocking Glass Company (1938–1971+) brown bottle base. The concrete assemblage consisted of approximately 25 pieces scattered throughout the site.

Environmental Setting

AZ AA:16:613(ASM) is located on a generally flat, open area in the western portion of the project area with a northeast-southwest-trending barbed wire fence bisecting the site. Surface sediments are light orangish brown sandy loam with 40 percent small to medium-sized angular poorly sorted gravels. Vegetation includes mesquite, cholla, snakeweed, brittlebush, and various forbs. Surface visibility at the time of survey was 76 to 99 percent. Site elevation is 2,415 feet (736 m) amsl.

Site Condition

The site is in good condition and has been minimally affected by sheet washing. The site appears to be 51 to 75 percent intact, and buried cultural deposits are unlikely.

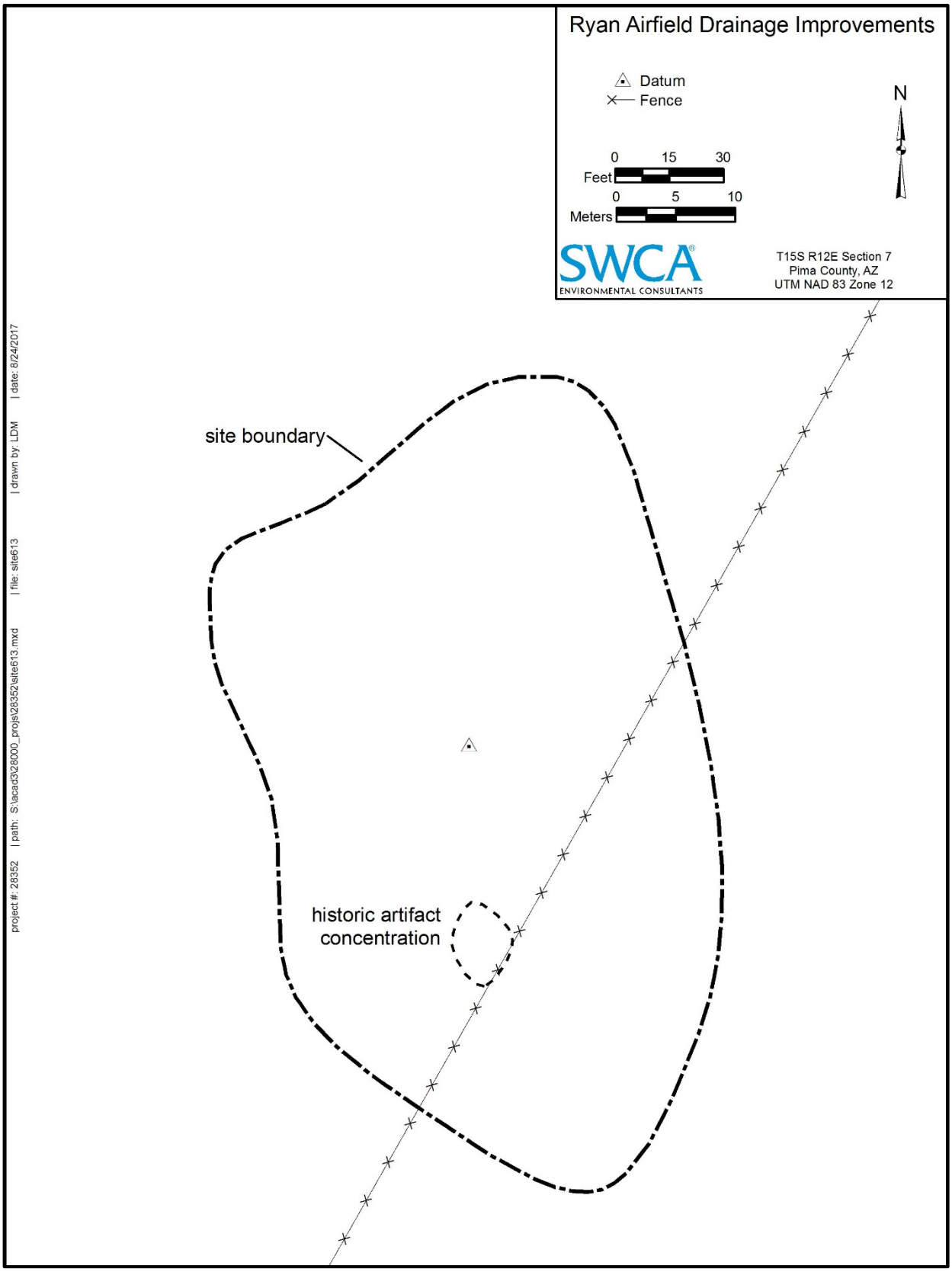


Figure 12. AZ AA:16:613(ASM) site map.

Figure 13. Machine part at AZ AA:16:613(ASM).

Figure 14. Light bulbs at AZ AA:16:613(ASM).

Interpretation and NRHP Eligibility

AZ AA:16:613(ASM) is a low-density historic artifact scatter. The diagnostic artifacts suggest use of the site from 1938 to the present. Based on the location of the site, the presence of machine parts and the large light bulbs, AZ AA:16:613(ASM) most likely is associated with the five radio towers that were depicted on the USGS 1957 San Xavier Mission, Arizona, 15-minute quadrangle. Additional map research (1969 San Xavier Mission, Arizona, 15-minute quadrangle) depicts a single radio tower at the airfield, which suggests that the five radio towers were removed sometime before 1969. Currently, there is a non-directional beacon and a remote transmitter/receiver located approximately 270 feet (82 m) southeast of the site. Buried archaeological deposits, including features, are unlikely to be present. SWCA recommends that the site is ineligible for the NRHP/ARHP under Criterion D. Additional work at this site does not have the potential to provide additional important information on the historic use of the area.

Isolated Occurrences

Nine IOs of artifacts were recorded during survey of the project area (Table 3; see Figure 6). The nine IOs are primarily historic-era manifestation and consist of food-related items. A few prehistoric ceramics were also found within the project area.

Table 3. Isolated Occurrences

IO No.	IO Description	Area of Dispersal	Easting*	Northing*
1	One prehistoric sand tempered plain ware sherd; historic glass consisting of four colorless fragments, one sun-colored amethyst fragment, and three brown fragments; and three sanitary cans	30 m	485064	3555938
2	One Type 19 (1930–1975) hole-in-top can, knife opened		484727	3555907
3	One Type 19 (1930–1975) hole-in-top can, ice-pick opened		484897	3555834
4	One prehistoric sand-tempered plain ware sherd		485034	3555850
5	One Type 19 (1930–1975) hole-in-top can and one hole-in-cap rectangular meat tin	20 m	484582	3555743
6	One soldered-seam sardine can		484833	3556009
7	One colorless Owen-Illinois (1936) clear glass bottle and one prehistoric sand-tempered plain ware sherd	15 m	484985	3555982
8	One colorless ketchup bottle, two sanitary cans, two lard buckets, and three colorless bottle fragments	30 m	484751	3556032
9	One Type 18 (1935–1945) hole-in-top can, knife opened		484896	3556711
10	One soldered hole-in-cap meat tin lid		484247	3555527

* UTM coordinates (NAD 83), Zone 12.

SUMMARY AND MANAGEMENT RECOMMENDATIONS

The survey of the project area resulted in identification of two newly recorded archaeological sites, AZ AA:16:612(ASM) and AZ AA:16:613(ASM), that are related to earlier facilities associated with the air field, and ten IOs consisting of several prehistoric sherds and historic trash scatters.

AZ AA:16:612(ASM) is a low-density historic artifact scatter with a small concrete pad and two upright bolts embedded in the modern ground surface. The diagnostic artifacts suggest a use of the site from 1917 to present. Based on the location of the site, the presence of the etched concrete pad, and the two embedded upright bolts, AZ AA:16:612(ASM) most likely is associated with the five radio towers that were depicted

on the USGS 1957 San Xavier Mission, Arizona, 15-minute quadrangle. Additional map research (1969 San Xavier Mission, Arizona, 15-minute quadrangle) shows that the five radio towers were removed sometime before 1969 and replaced with a single radio tower. Currently, there is a non-directional beacon and a remote transmitter/receiver approximately 540 feet (164 m) west of site. Buried archaeological deposits, including features, are unlikely to be present. SWCA recommends that the site is ineligible for the NRHP/ARHP under Criterion D. Additional work at this site does not have the potential to provide additional important information on the historic use of the area.

AZ AA:16:613(ASM) is a low-density historic artifact scatter. The diagnostic artifacts suggest use of the site from 1938 to the present. Based on the location of the site, the presence of machine parts, and the large light bulbs, AZ AA:16:613(ASM) most likely is associated with the five radio towers that were depicted on the USGS 1957 San Xavier Mission, Arizona, 15-minute quadrangle. Additional map research (1969 San Xavier Mission, Arizona, 15-minute quadrangle) depicts a single radio tower at the airfield, which suggests that the five radio towers were removed some time before 1969. Currently, there is a non-directional beacon and a remote transmitter/receiver located approximately 270 feet (82 m) southeast of the site. Buried archaeological deposits, including features, are unlikely to be present. SWCA recommends that the site is ineligible for the NRHP/ARHP under Criterion D. Additional work at this site does not have the potential to provide additional important information on the historic use of the area.

SWCA recommends that development of the project area would result in a finding of No Adverse Effect.

If previously undocumented buried cultural resources are identified during ground-disturbing activities, all work in the immediate vicinity of the discovery should stop until the find can be evaluated by a professional archaeologist. In event that human remains and/or funerary items are discovered, Arizona Revised Statutes 41-844 require that the ASM be notified of the discovery so that the groups who claim cultural or religious affinity to them can make appropriate arrangements for the repatriation and reburial of the remains.

REFERENCES CITED

Arizona State Museum (ASM)
1995 *Revised Site Definition Policy*. Arizona State Museum, University of Arizona, Tucson.

Ayres, James E.
1984 The Anglo Period in Archaeological and Historical Perspective. *The Kiva* 49(3–4):225–232.

Barr, David M. R.
2009 *Archaeological Survey of Approximately 15 Miles of the SWTC Pantano to Sahuarita Transmission Line (Poles 96–196), Pima County, Arizona*. Cultural Resources Report 09-331. SWCA Environmental Consultants, Tucson.

2010 *Archaeological Survey for the Authorization of BLM Right-of-Way AZA 32485 in Pima County, Arizona*. Cultural Resources Report No. 10-477. SWCA Environmental Consultants, Tucson.

Bayman, James M.
1992 The Circulation of Exotics in a Tucson Basin Platform Mound Community. In *Proceedings of the Second Salado Conference, Globe, Arizona*, edited by Richard C. Lange and S. Germick, pp. 31–37. Occasional Paper of the Arizona Archaeological Society, Phoenix.

Bolton, H. E.
1936 *The Rim of Christendom: A Biography of Eusebio Francisco Kino, Pacific Coast Pioneer.* Macmillan Company, New York.

Brack, Michael
2003 *An Archaeological Assessment of the Ryan Airfield Landfill, Pima County, Arizona*. Project Report No. 03-119. Desert Archaeology, Inc., Tucson.

Brown, David E. (editor)
1994 *Biotic Communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

Castetter, E. F., and W. H. Bell
1942 *Pima and Papago Indian Agriculture*. University of New Mexico, Albuquerque.

Clemensen, Berle A.
1987 *Cattle, Copper, and Cactus: The History of Saguaro National Monument, Arizona.* U.S. Department of the Interior, National Park Service, Washington, D.C.

Coffman Associates, Inc.
2010 *Airport Master Plan for Ryan Airfield, Tucson, Arizona*. Coffman Associates, Inc., Scottsdale.

Craig, Douglas B.
2004 *A Cultural Resources Survey of 35 Acres Near the Intersection of Valencia Road and Ajo Way, Pima County, Arizona*. Technical Report 04-89. Northland Research, Inc., Tempe.

Dart, Allen
1986 *Archaeological Investigations at La Paloma: Archaic and Hohokam Occupations at Three Sites in the Northeastern Tucson Basin, Arizona*. Anthropological Papers No. 4. Institute for American Research and SWCA Environmental Consultants, Tucson.

Doelle, William H.
1984 The Tucson Basin during the Protohistoric period. *The Kiva* 49(3–4):195–211.

1985 *Excavations at the Valencia Site: A Preclassic Hohokam Village in the Southern Tucson Basin.* Anthropological Paper No. 3. Institute for American Research, Tucson.

Ervin, Richard G.
1986 Archaeological Clearance Survey along State Route 86, Pima County, Arizona. Letter Report for Johnson-Brittain and Associates, dated 12/4/86. Arizona State Museum, University of Arizona, Tucson.

Euler, R. Thomas
1989 *An Archaeological Survey of Approximately 200 Acres near Ryan Airfield, Pima County, Arizona*. SWCA Environmental Consultants, Tucson.

Freeman, Andrea K. L.
1994 Archaeological Survey for a Proposed Detention Basin and Apron Expansion at Ryan Airfield, Pima County, Arizona. Letter Report No. 94-135. Desert Archaeology, Inc., Tucson.

Garate, Don
1994 *Juan Bautista de Anza National Historic Trail.* Southwest Parks and Monuments Association, Tucson.

Gregory, David A., and Fred L. Nials
1986 Observations Concerning the Distribution of Classic Period Hohokam Platform Mounds. In *Proceedings of the 1983 Hohokam Symposium*, Pt. 1, edited by Alfred E. Dittert, Jr., and D. E. Dove, pp. 373–388. Occasional Paper No. 2. Arizona Archaeological Society, Phoenix.

Hall, Dorothy
1972 *Archaeological Resources: BR, Orme Reservior, Phase I Salt Arm, Maricopa County., Arizona*. Arizona State Museum, University of Arizona, Tucson.

Harrison III, James B. and S. Jerome Hesse
2003 *A Class III Cultural Resources Survey of 1.9-Mile-Long, 20-Foot-Wide Power Line Right-of-Way Near Snyder Hill, Pima County, Arizona*. Cultural Resources Report No. 03-360. SWCA Environmental Consultants, Tucson.

Harry, Karen, and Richard Ciolek-Torrello
1992 *Farming the Floodplain: A Look at Prehistoric and Historic Land-Use along the Rillito, Test Excavations and National Register Evaluations of Eight Prehistoric and Historic Sites along the Rillito River, Pima County, Arizona*. Technical Series No. 35. Statistical Research, Inc., Tucson.

Haury, Emil W.
1976 *The Hohokam: Desert Farmers and Craftsmen*. University of Arizona, Tucson.

Henry, Bonnie
1992 *Another Tucson*. Arizona Daily Star Publishing Company, Tucson.

Hill, Matthew, E. Jr., and J. Simon Bruder
1999 *Cultural Resources Survey for the Three Points to Kinney Pavement Preservation Project, Pima County, Arizona*. Dames & Moore, Phoenix.

Hopkins, Maren
2004 *A Cultural Resources Survey of 40 Acres Near the Intersection of Valencia Road and Valhalla Road, Pima County, Arizona*. Technical Report No. 04-159. Northland Research, Inc., Tempe.

Howell, Joseph
2006 *The Pomegranate II Survey: A Class III Cultural Resources Survey of Approximately 480 Acres Near the Intersection of Valhalla Road and Valencia Road in Pima County, Arizona*. Cultural Resources Report 2006-29. WestLand Resources, Tucson.

Huckell, Bruce B.
1984 The Paleo-Indian and Archaic Occupation of the Tucson Basin: An Overview. *Kiva* 49:133–145.

1995 *Of Marshes and Maize: Preceramic Agricultural Settlements in the Cienega Valley, Southeastern Arizona*. Anthropological Papers of the University of Arizona. University of Arizona Press, Tucson.

1996 The Archaic Prehistory of the North American Southwest. *Journal of World Prehistory* 10(3):305–373.

Jones, Jeffery T., and Allen Dart
2002 Cultural Resources Survey of 30.97 Miles of 66-foot Wide Communications Cable Access Corridors West of Tucson in Pima County, Arizona. Letter Report No. 2002.002. Old Pueblo Archaeology Center, Arizona.

Keane, Melissa, and J. Simon Bruder
1999 *Good Roads Everywhere: Historic and Regulatory Contexts for the Evaluation of Arizona Roads*. Intermountain Cultural Resource Services Research Paper No. 42. Dames and Moore, Phoenix.

Mabry, J. B. (editor)
1998 *Archaeological Investigations of Early Village Sites in the Middle Santa Cruz Valley: Analysis and Synthesis*. Anthropology Papers No. 19. Center for Desert Archaeology, Tucson.

Maldonado, Ronald P.
1988a An Archaeological Survey of 3.5-Miles of Right-of-Way for a Proposed Powerline. Letter Report. Cultural and Environmental Systems, Tucson.

1988b An Archaeological Survey of a 2-Mile-Long Proposed Right-of-Way for Trico Electric Cooperative, Inc. Letter Report. Cultural and Environmental Systems, Tucson.

Rawson, Paul M.
2011 *Archaeological Survey of 758 Acres for the Proposed Tucson Trap & Skeet Expansion Project, Pima County, Arizona*. Cultural Resources Report No. 11-83. SWCA Environmental Consultants, Tucson.

Rieder, Morgan
2001 *Cultural Resources Survey of a 0.5-Mile Right-of-Way on State Trust Land in the Avra Valley, Pima County, Arizona*. Technical Report No. 2001-157. Aztlan Archaeology.

Roth, Barbara J.
1995 Late Archaic Occupation of the Upper Bajada: Excavations at AZ AA:12:84(ASM), Tucson Basin. *Kiva* 61(2):189–207.

Sayles, Edward B.
1983 *The Cochise Cultural Sequence in Southeastern Arizona*. Anthropological Papers No. 42. University of Arizona Press, Tucson.

Sayles, Edward B., and Ernst Antevs
1941 *The Cochise Culture*. Medallion Papers No. 29. Gila Pueblo, Globe, Arizona.

Sayre, David K.
2002 *A Cultural Resource Survey of an Approximately 149-Acre Parcel of Private Land on East Valencia Road, Pima County, Arizona*. Cultural Resources Report No. 02-34. SWCA Environmental Consultants, Tucson.

Seymour, Deni J.
1986 3.25 Mile Survey of Reach 6 Corridor from Southern Edge Pascua Yaqui Reservation (Black Mountain Pump Plant) to area of Proposed Reservoir in T15S, R12E, Sec. 2. Letter Report dated July 29, 1986. Arizona State Museum, University of Arizona, Tucson.

2011 *Where the Earth and Sky are Sewn Together*. University of Utah Press, Salt Lake City.

Sheridan, Thomas E.
1995 *Arizona: A History*. University of Arizona Press, Tucson.

Simonis, Don
1997 *Simonis Milk Can Guide*. Bureau of Land Management, Kingman Field Office, Kingman.

Stein, Pat H.
1988 *Homesteading in the Depression: A Study of Two Short-Lived Homesteads in the Harquahala Valley, Arizona*. Northland Research, Inc., Flagstaff, Arizona.

1990 *Homesteading in Arizona, 1862 to 1940—A Guide to Studying, Evaluating, and Preserving Historic Homesteads; A Component of the Arizona Historic Preservation Plan*. Arizona State Historic Preservation Office, Phoenix.

Stephen, David V. M.
2003 *Cultural Resources Survey of the Sonoran Ranch Estates II Project Near Tucson, Pima County, Arizona*. Report No. 031566. Professional Archaeological Services of Tucson, Tucson.

Tompkins, Charles
1996 *An Archaeological Assessment of a 151 Acre Parcel at the Northwest Corner of Valencia Road and Valhalla Road in Avra Valley, Arizona*. Tierra Archaeological and Environmental Consultants, Tucson.

Wallace, Henry D., James M. Heidke, and William H. Doelle
1995 Hohokam Origins. *Kiva* 60(4):575–618.

Whittlesey, Stephanie M., Richard Ciolek-Torrello, and Matthew A. Sterner
1994 *Southern Arizona, the Last 12,000 Years: A Cultural–Historic Overview for the Western Army National Guard Aviation Training Site*. Technical Series No. 48. Statistical Research Inc., Tucson.

Wilcox, David R.
1991 The Mesoamerican Ballgame in the American Southwest. In *The Mesoamerican Ballgame*, edited by Vernon L. Scarborough and David R. Wilcox, pp. 101–125. University of Arizona, Tucson.

Wilson, Eldred D.
1949 *History of Mining in Pima County, Arizona*. 5th ed. Tucson Chamber of Commerce, Tucson.

Wyman, Terrence B., and Allen Dart
2001 Cultural Resource Survey of 71.02 Acres for Proposed Creation of the Ryan Field County Park West of Tucson in Pima County, Arizona (Pima County W.O. HYX–662). Letter Report No. 2001.032. Old Pueblo Archaeology Center, Tucson.

APPENDIX A

Previous Research Map

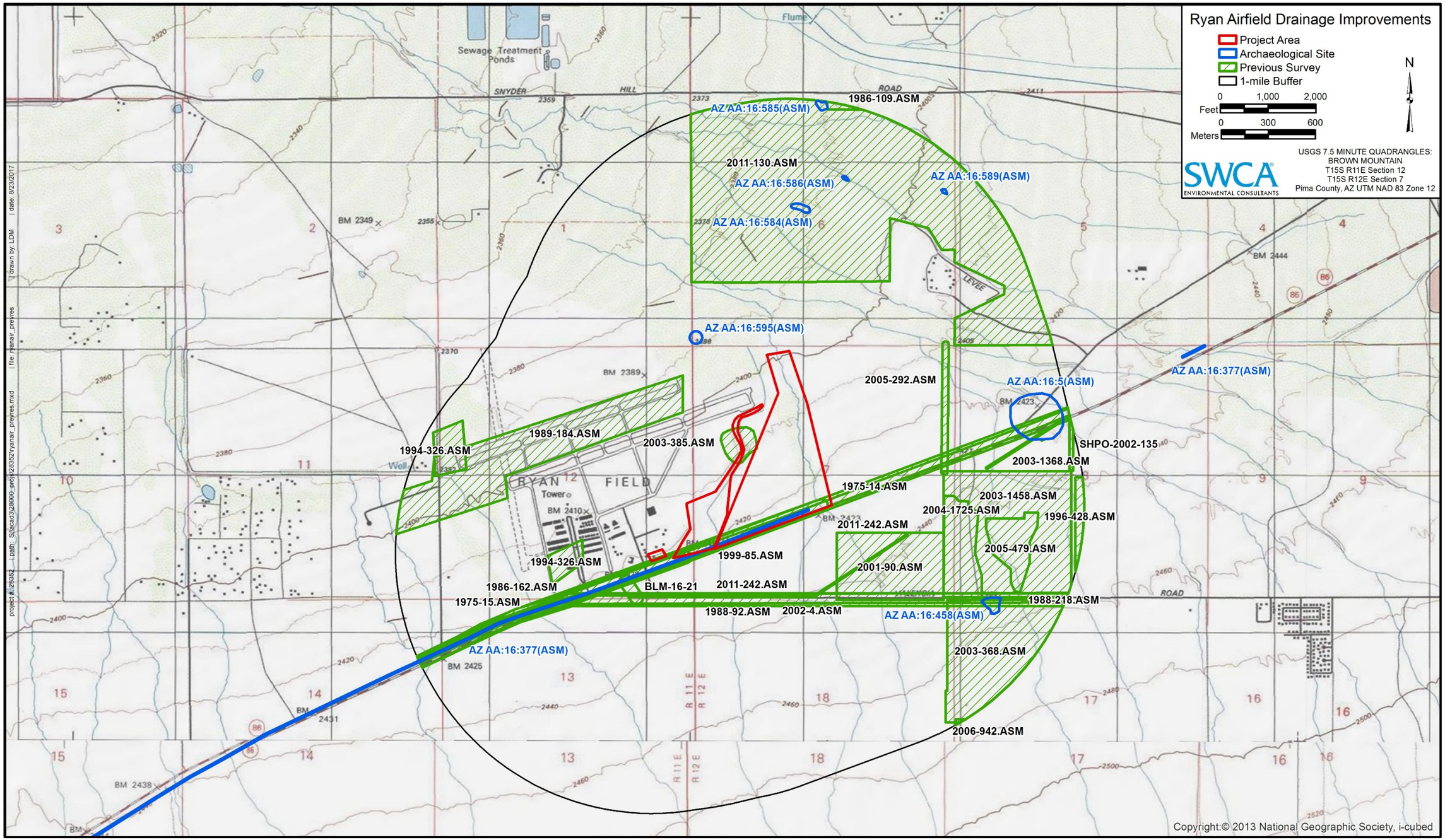


Figure A-1. Previously recorded sites and surveys within a 1-mile radius of the project area.

Appendix G – FAA CATEX Approval

Prepared by Federal Aviation Administration, 2017

U.S. Department
of Transportation
Federal Aviation Administration

Western-Pacific Region
Airports Division
Phoenix Airports District Office

3800 N. Central Avenue
Suite 1025, 10th Floor
Phoenix, AZ 85012

September 13, 2017

Eric Roudebush
Director of Environmental Services
Tucson Airport Authority
7250 S. Tucson Boulevard, Suite 300
Tucson, AZ 85756

RE: Categorical Exclusion Approval for the Proposed Drainage Improvements, Ryan Airfield (RYN), Tucson, Pima County, Arizona

Dear Mr. Roudebush:

The Federal Aviation Administration (FAA) has reviewed the environmental information you submitted for the proposed drainage improvements at Ryan Airfield (RYN), Tucson, Arizona. The proposed project involves construction of a 1,300 linear feet earthen berm and placement of riprap and concrete cut-off wall to the existing earthen berm. No historic properties were identified within the project's area of potential effect. Therefore, the FAA has made a finding of "*no historic properties affected*" for the proposed project. The Arizona State Historic Preservation Officer (SHPO) concurred with this finding on September 13, 2017. If previously unidentified cultural materials are encountered during project construction, work shall cease immediately at that location, TAA will notify FAA and SHPO as soon as possible to determine the appropriate course of action.

There are no federally listed threatened and endangered species, critical or suitable habitats at the project site. Thus, FAA has determined the project will have "*no effec*t" to federally listed species.

The FAA has determined that the proposed project is Categorically Excluded pursuant to FAA Order 1050.1F, Paragraph 5-6.4l as it relates to the National Environmental Policy Act of 1969, as amended (NEPA). Therefore, no further federal environmental disclosure documentation for this project is necessary for NEPA purposes.

This letter is only to notify you that the proposed project has complied with NEPA. This is not a notice of final project approval or funding availability.

Subsequent to receiving this letter, if there is any change in the project's description of work and/or in location and/or size, the Airport Sponsor must contact the Phoenix Airport District Office Environmental Protection Specialist to evaluate potential impacts.

Should you have any questions regarding this matter, please contact me at (602) 792-1066 or by email dee.phan@faa.gov.

Sincerely,

Dee Phan

Dee Phan
Environmental Protection Specialist