APPENDIX H
WATER RESOURCES

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JURISDICTIONAL DETERMINATION COORDINATION

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U.S Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Office of Airports

15000 Aviation Blvd, Suite 3012
Lawndale, CA 90261

DEC - 5 2017

Ms. Sallie Diebolt, Chief
Arizona Section Regulatory Branch
U.S. Army Corps of Engineers
3636 North Central Avenue, Suite 900
Phoenix, Arizona 85012-1927

Dear Ms. Diebolt:

Tucson International Airport, Tucson, Arizona
Clean Water Act Section 404 Preliminary Jurisdictional Delineation
for the Proposed Airfield Safety Enhancement Project
Reference Number: SPL201700643-KWG

The Federal Aviation Administration (FAA) is preparing a Draft Environmental Impact Statement (EIS) for the Proposed Airfield Safety Enhancement Project (ASEP) including real property transactions at Tucson International Airport (TUS) in Tucson, Pima County, Arizona (the Proposed Action). The FAA requests U.S. Army Corps of Engineers concurrence of the FAA's jurisdictional determination for purposes of the Clean Water Act Section 404 process.

The FAA is the lead federal agency for preparation of the EIS. The EIS is being prepared under the National Environmental Policy Act of 1969 (NEPA), its implementing regulations found at Title 40, Code of Federal Regulations (C.F.R.) Part 1500, as well as FAA's policies and procedures for complying with NEPA found in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*. The United States Air Force (USAF) and the National Guard Bureau (NGB) are cooperating agencies as described under 40 C.F.R. § 1501.6 for preparation of the EIS.

The results of this coordination effort will be incorporated into the Draft EIS for the Proposed Action at TUS. As shown on the enclosed Exhibit 1, TUS is located on 8,343 acres in Tucson, Arizona in Pima County south of the City of Tucson central business district and near both Interstate 10 and Interstate 19. The USAF owned land, known as Air Force Plant 44 (AFP 44), is located along the southwest border of the Airport. Two study areas have been developed for the EIS as shown on Exhibit 2.

The General Study Area (GSA) is defined as the area where both direct and indirect impacts may result from the development of the Proposed Action and reasonable alternatives. The Detailed Study Area (DSA) is defined as the area where direct impacts may result from the Proposed Action and its alternatives. The DSA is comprised of

several noncontiguous project sites within an area that is approximately four miles long and two miles wide. The Proposed Action is located in portions of Township 15S, Range 14E, Sections 17, 18, 19, 20, 21, 28, 29, 32, & 33 32.11252 -110.93930, WGS 84. Elevation within the DSA is 2,628 feet above mean sea level.

A pedestrian survey to identify Waters of the United States in the areas to be directly and indirectly impacted was conducted by Daniel Bunting and Chase Viorin of Harris Environmental, Inc. on June 29, 2017. The aerial photograph used for this preliminary jurisdictional delineation (PJD) was taken in October 2016. This photograph accurately depicts site conditions present during the pedestrian survey. The U.S. Fish and Wildlife Service National Wetland Inventory (NWI) maps were also reviewed and no mapped wetlands were found within the DSA. During the pedestrian survey, no potential wetlands were observed in the DSA, or immediately upstream or downstream.

In order to determine the area of a jurisdictional Waters of the U.S., the ordinary high water marks were used, including but not limited to, differences in vegetation, changes in soil characteristics, water stains, cut banks, and presence of litter and debris.

The following items are included for your review:

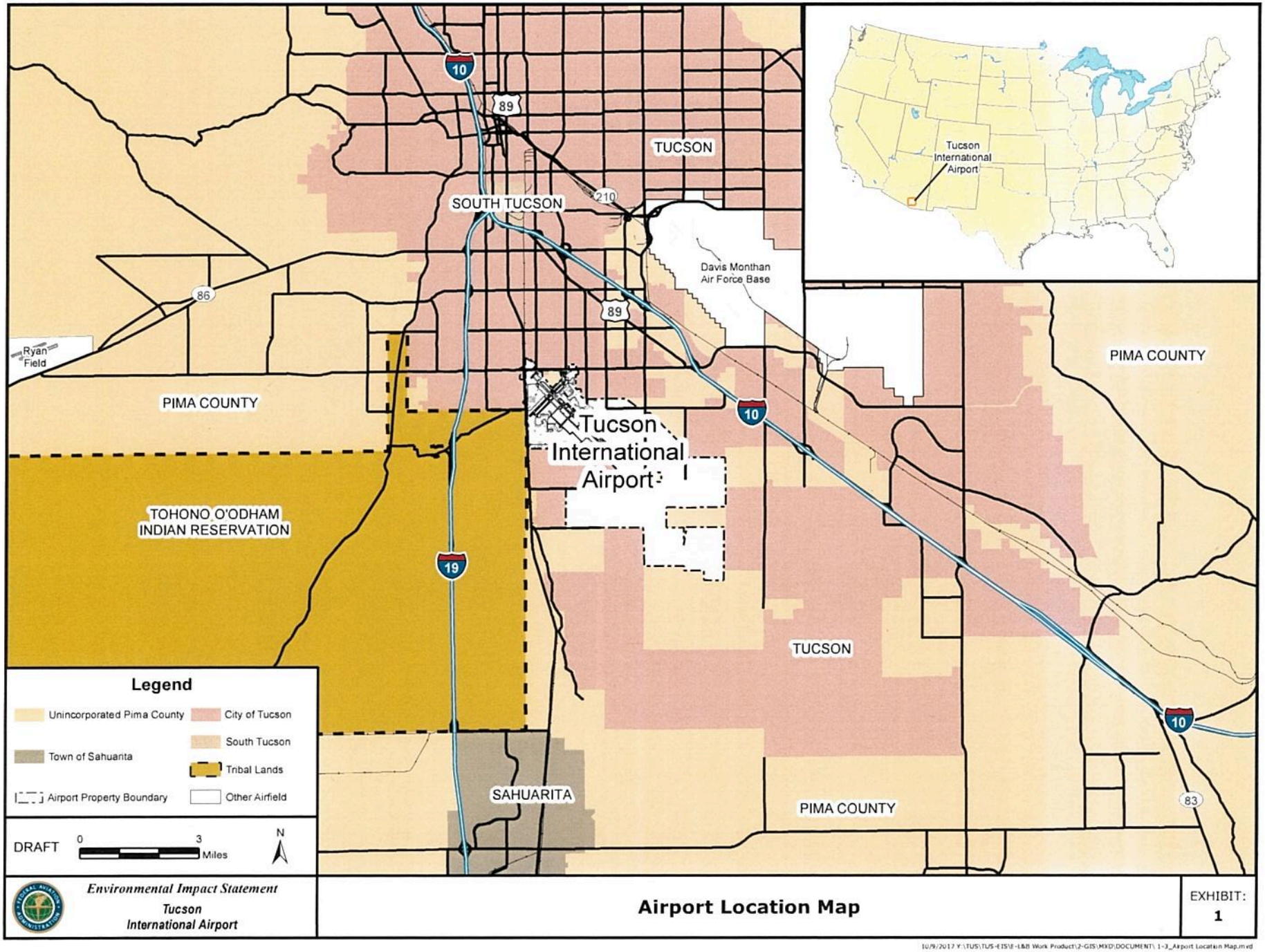
- Exhibit 1 Airport Location Map
- Exhibit 2 EIS Study Areas
- Preliminary Jurisdictional Determination Form
- Water Data Sheet
- Appendix A
    - Ground Level Photographs
    - (Aerial of areas surveyed with PJD overlaid for evaluation)

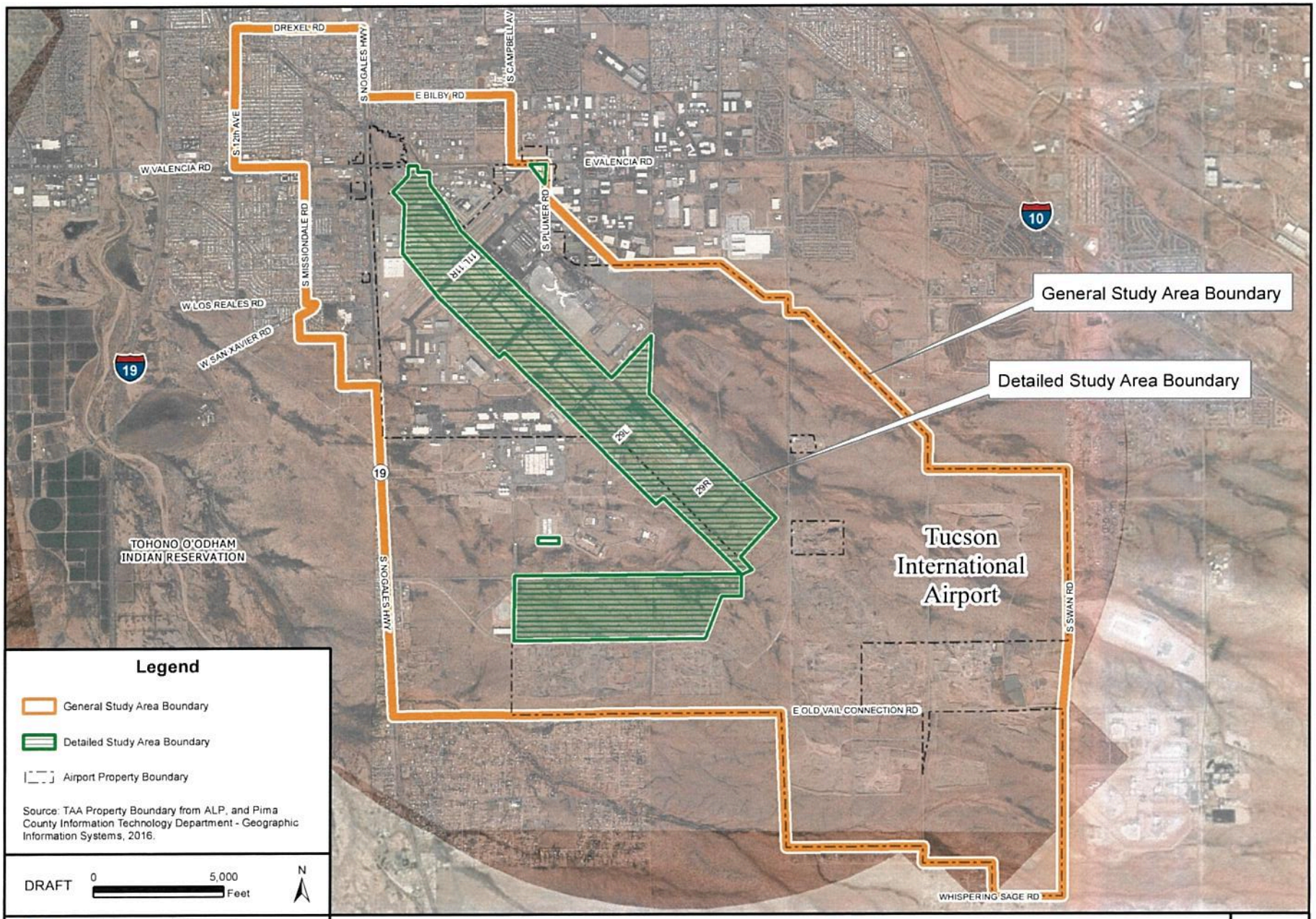
Please call me at 310/725-3615 or email me at dave.kessler@faa.gov if you have any questions or need additional information.

Sincerely,

David B. Kessler, M.A., AICP
Regional Environmental Protection Specialist

Enclosures


Tucson International Airport
TUCSON
SOUTH TUCSON
Davis Monthan Air Force Base
Ryan Field
PIMA COUNTY
Tucson International Airport
TOHONO O'ODHAM INDIAN RESERVATION
SAHUARITA
PIMA COUNTY
TUCSON
PIMA COUNTY
10
89
210
86
89
10
19
10
83
Legend
Unincorporated Pima County
City of Tucson
South Tucson
Town of Sahuarita
Tribal Lands
Airport Property Boundary
Other Airfield
DRAFT
0
3
Miles
N
Environmental Impact Statement
Tucson International Airport
Airport Location Map
EXHIBIT: 1
10/9/2017 Y:\TUS\TUS-EIS\E-L&B Work Product\2-GIS\MXD\DOCUMENT\ 1-3_Airport Location Map.mxd



10/5/2017 Y:\TUS\TUS-EIS\E-L&B Work Product\2-GIS\MXD\DOCUMENT\ 3-2_EIS Study Areas - REV20170918.mxd

DRAFT

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 #: | PJD Date: 6/29/17

State: | City/County: Tucson/Pima

Nearest Waterbody: Santa Cruz River

Location: TRS, LatLong or UTM: Township 15S, Range 14E, Sections 17, 18, 19, 20, 21, 28, 29, 32, & 33
32.11252 -110.93930 WGS 84

Name/ Address of Person Requesting PJD: Daniel Bunting
Harris Environmental Group, Inc.
650 N 6th Ave, Tucson, AZ 85716

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

Non-Wetland Waters: linear ft | width 17.57 acres | Stream Flow: Ephemeral

Wetlands: 0 acre(s) | Cowardin Class: N/A

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

☐ 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: Landrum & Brown
- ☑ 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: Tucson & Tucson SW
- ☐ 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): 10/10/2016 Metro, DigitalGlobe
  ☑ Other (Name & Date): Ground level photographs, June 29th, 2017
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

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.

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 | File/ORM # | PJD Date: June 29th, 2017

State | City/County: Tucson/Pima | Person Requestinq PJD: Daniel Bunting

Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
1	32.10477	-110.92903	Riverine	6717	Non-Section 10 non-wetlar
2	32.09004	-110.93028	Riverine	53359	Non-Section 10 non-wetlar
3	32.09011	-110.92140	Riverine	10996	Non-Section 10 non-wetlar
			n/a		Non-Section 10 non-wetlar
			n/a		Non-Section 10 non-wetlar
			n/a		Non-Section 10 non-wetlar

Notes:

Potential impacts to WOUS being analyzed in the EIS. Findings and any potential mitigation measures will be coordinated with USACE.

Water Data Sheet

Waters_Name	Cowardin_Code	HGM_Code	Measurement_Type	Amount
Hughes Wash ephemeral tributary 1	R4SB4	RIVERINE	Area	1.7
Hughes Wash ephemeral tributary 2	R4SB4	RIVERINE	Area	13.2
Hughes Wash	R4SB4	RIVERINE	Area	2.7

Units	Waters_Type	Latitude	Longitude	Local_Waterway
ACRE	DELINEATE	32.10477	-110.92903	Hughes Wash ephemeral tributary 1
ACRE	DELINEATE	32.09004	-110.93028	Hughes Wash ephemeral tributary 2
ACRE	DELINEATE	32.09011	-110.9214	Hughes Wash

APPENDIX A – Project Ground Level Photographs

Photo 1: Shallow drainage, Hughes Trib 1

Photo 2: Exit of drainage toward culvert

Photo 3: 6 x 3-ft culvert pipes (inflow)

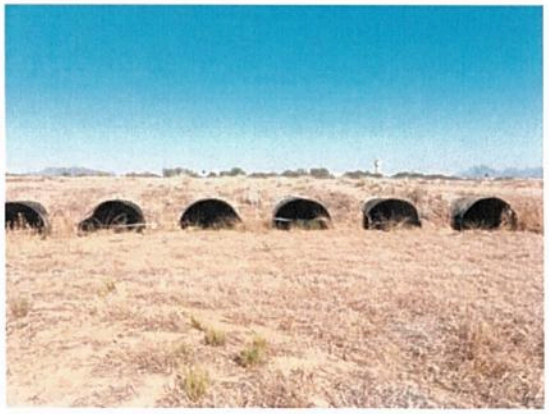
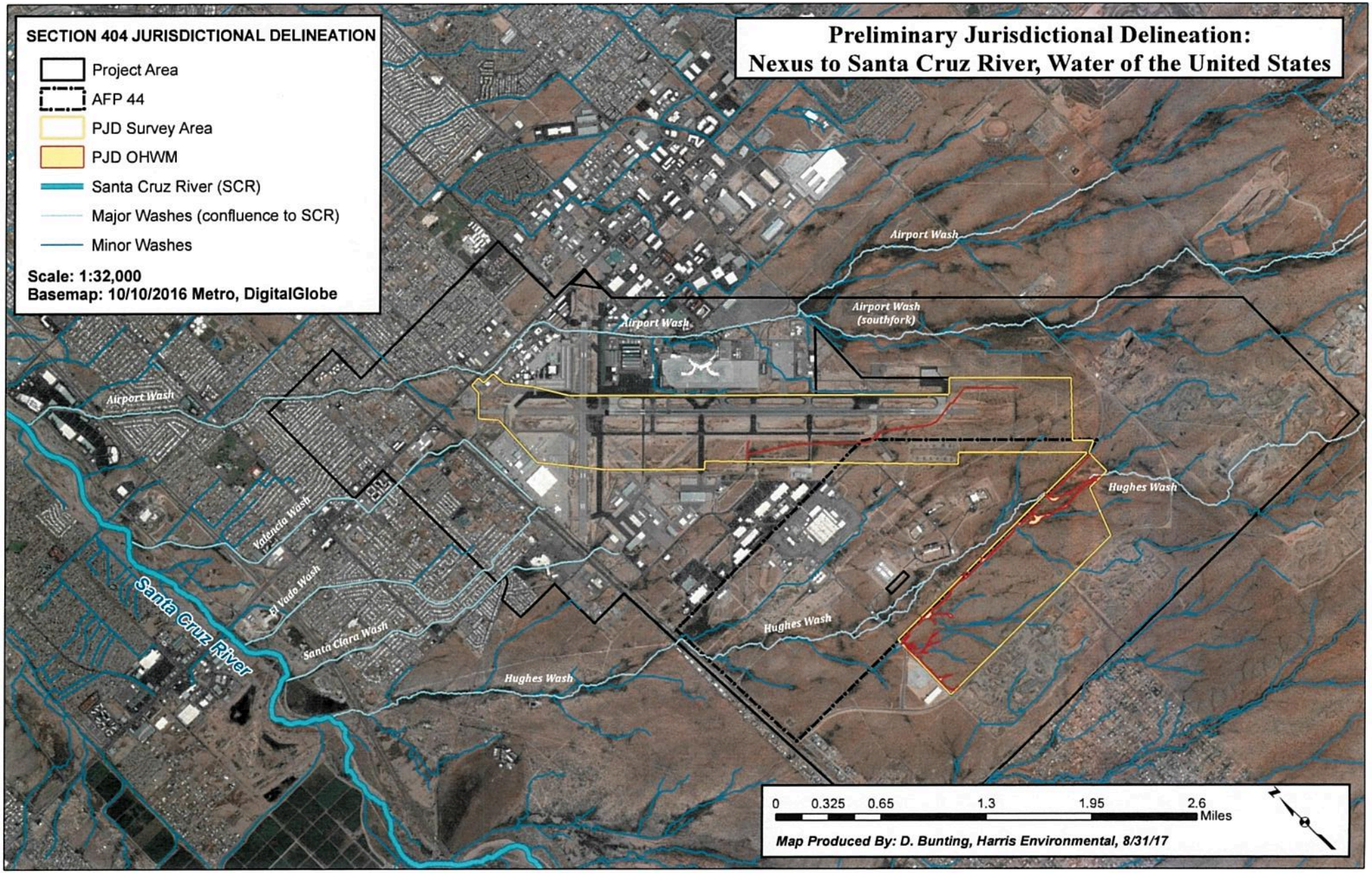
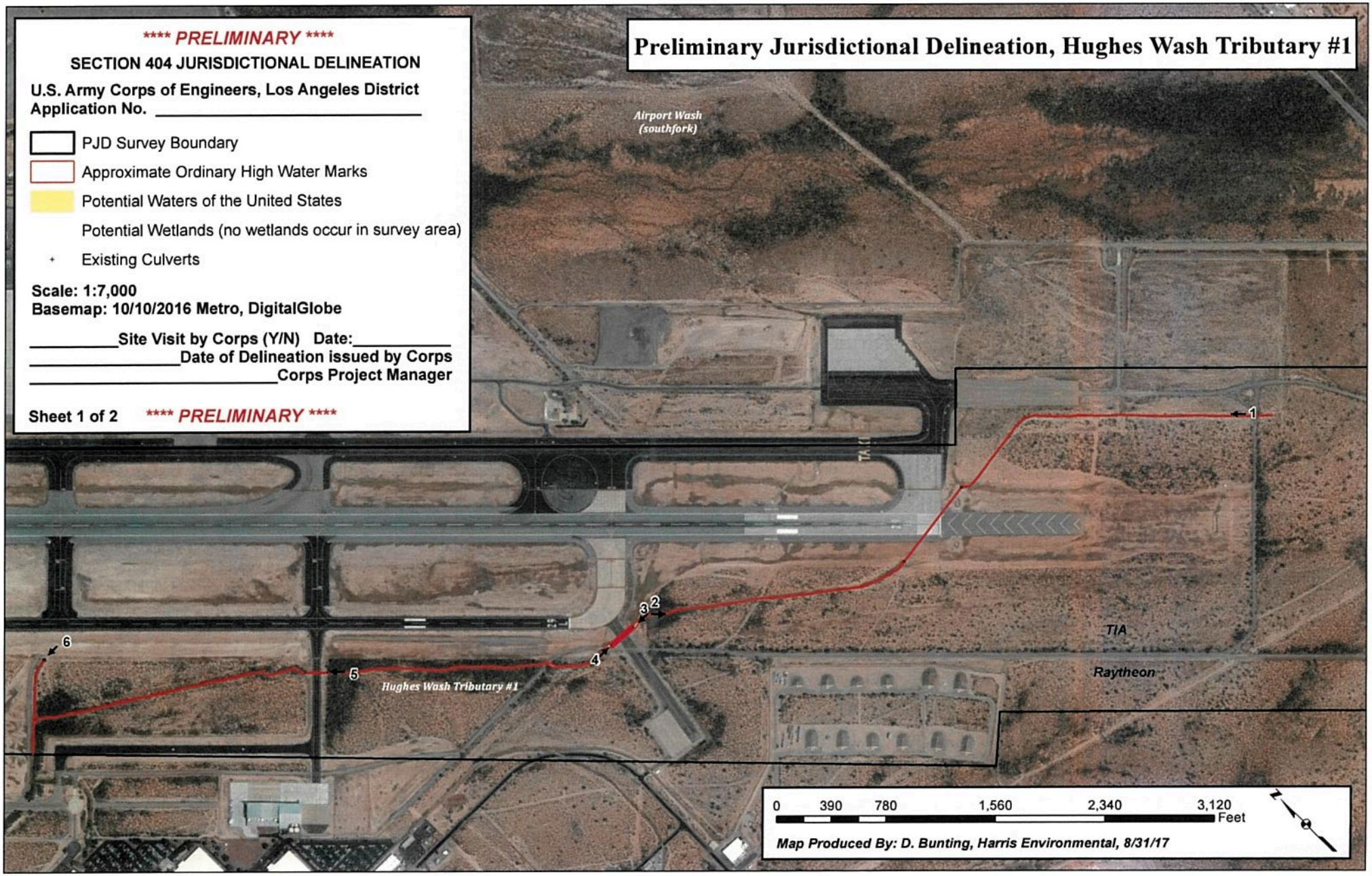


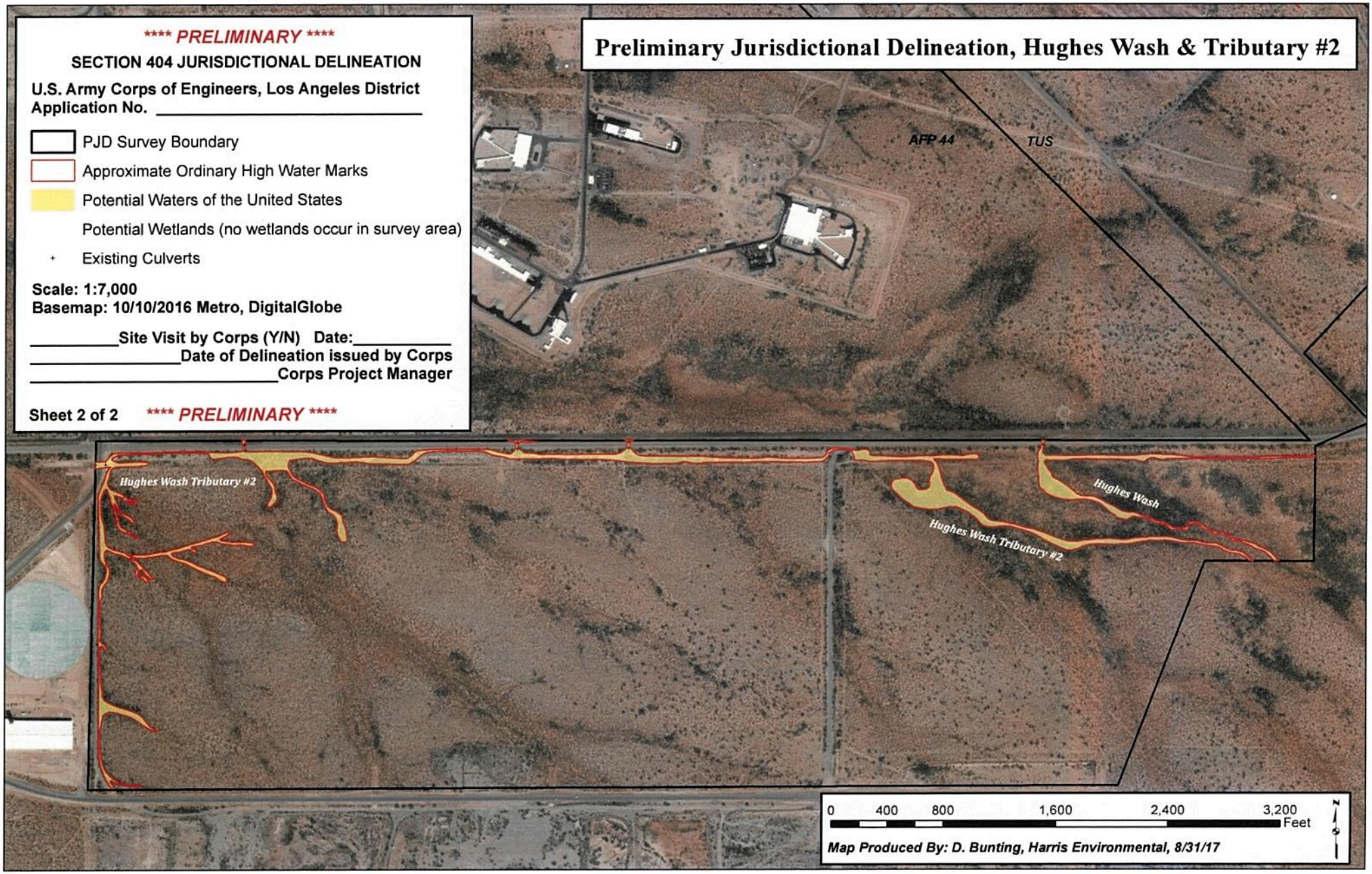
Photo 4: 6 x 3-ft culvert pipes (outflow)

Photo 5: Culvert (inflow)

Photo 6: Culvert (outflow)


SECTION 404 JURISDICTIONAL DELINEATION
Project Area
AFP 44
PJD Survey Area
PJD OHWM
Santa Cruz River (SCR)
Major Washes (confluence to SCR)
Minor Washes
Scale: 1:32,000
Basemap: 10/10/2016 Metro, DigitalGlobe
Preliminary Jurisdictional Delineation:
Nexus to Santa Cruz River, Water of the United States
Airport Wash
Airport Wash
Airport Wash (southfork)
Airport Wash
Hughes Wash
Hughes Wash
Hughes Wash
Valencia Wash
El Vado Wash
Santa Clara Wash
Santa Cruz River
0 0.325 0.65 1.3 1.95 2.6
Miles
Map Produced By: D. Bunting, Harris Environmental, 8/31/17


**** PRELIMINARY ****
SECTION 404 JURISDICTIONAL DELINEATION
U.S. Army Corps of Engineers, Los Angeles District
Application No. _____
PJD Survey Boundary
Approximate Ordinary High Water Marks
Potential Waters of the United States
Potential Wetlands (no wetlands occur in survey area)
Existing Culverts
Scale: 1:7,000
Basemap: 10/10/2016 Metro, DigitalGlobe
_____Site Visit by Corps (Y/N) Date:_____
_____Date of Delineation issued by Corps
_____Corps Project Manager
Sheet 1 of 2
**** PRELIMINARY ****
Preliminary Jurisdictional Delineation, Hughes Wash Tributary #1
Airport Wash (southfork)
1
2
3
4
5
6
Hughes Wash Tributary #1
TIA
Raytheon
0 390 780 1,560 2,340 3,120 Feet
Map Produced By: D. Bunting, Harris Environmental, 8/31/17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Existing Culverts
Scale: 1:7,000
Basemap: 10/10/2016 Metro, DigitalGlobe
_____Site Visit by Corps (Y/N) Date:_____
_____Date of Delineation issued by Corps
_____Corps Project Manager
Sheet 2 of 2
**** PRELIMINARY ****
Preliminary Jurisdictional Delineation, Hughes Wash & Tributary #2
AFP 44
TUS
Hughes Wash Tributary #2
Hughes Wash
Hughes Wash Tributary #2
0 400 800 1,600 2,400 3,200 Feet
Map Produced By: D. Bunting, Harris Environmental, 8/31/17

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

December 14, 2017

SUBJECT: Preliminary Jurisdictional Determination

David Kessler
Federal Aviation Administration
Western-Pacific Region, Office of Airports
15000Aviation Blvd. Suite 3012
Lawndale, California 90261

Dear Mr. Kessler:

I am responding to your request (File No. SPL-2017-00643-KWG) dated December 5, 2017 for a preliminary Department of the Army jurisdictional determination (JD) for the proposed Tucson International Airport's Airfield Safety Enhancement Project site midpoint Lat/Long: 32.10477/-110.92903 located within the city of Tucson, Pima County, Arizona.

The Corps' evaluation process for determining whether a Department of the Army permit is needed involves two tests. If both tests are met, a permit would likely be required. The first test determines whether the proposed project is located within the Corps' geographic jurisdiction (i.e., it is within a water of the United States). The second test determines whether as proposed, the project involves a regulated activity under Corps' authority, i.e., Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, or Section 103 of the Marine Protection Research and Sanctuaries Act. The determination in this letter pertains only to the question of geographic jurisdiction.

Based on available information, I have preliminarily determined waters of the U.S. may be present on the proposed Tucson International Airport's Airfield Safety Enhancement Project site in the approximate locations noted on the enclosed map. The basis for this finding may be found on the enclosed Preliminary Jurisdictional Determination (JD) form. Preliminary JDs are non-binding indications of the presence of waters of the U.S., including wetlands, on a parcel. Preliminary JDs are advisory in nature and may not be appealed.

This determination was conducted to identify the extent of the Corps' Clean Water Act jurisdiction on the proposed Tucson International Airport's Airfield Safety Enhancement Project site identified in your request. 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.

Thank you for participating in the regulatory program. If you have any questions, please contact Kevin Grove at (602) 230-6957 or via e-mail at Kevin.W.Grove@usace.army.mil. 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,

Michael W. Langley
Senior Project Manager

SPL201700643 Enclosure(s)

1. 20171211-201700643-FAA-PJD-Maps
2. 20171211_201700643_FAA_PJDform

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Federal Aviation Administration, Attn: Mr. David Kessler	File No.: SPL-2017-00643-KWG	Date: December 14, 2017

Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
X	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at *http://www.usace.army.mil/cecw/pages/reg_materials.aspx* or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer (address on reverse). This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:

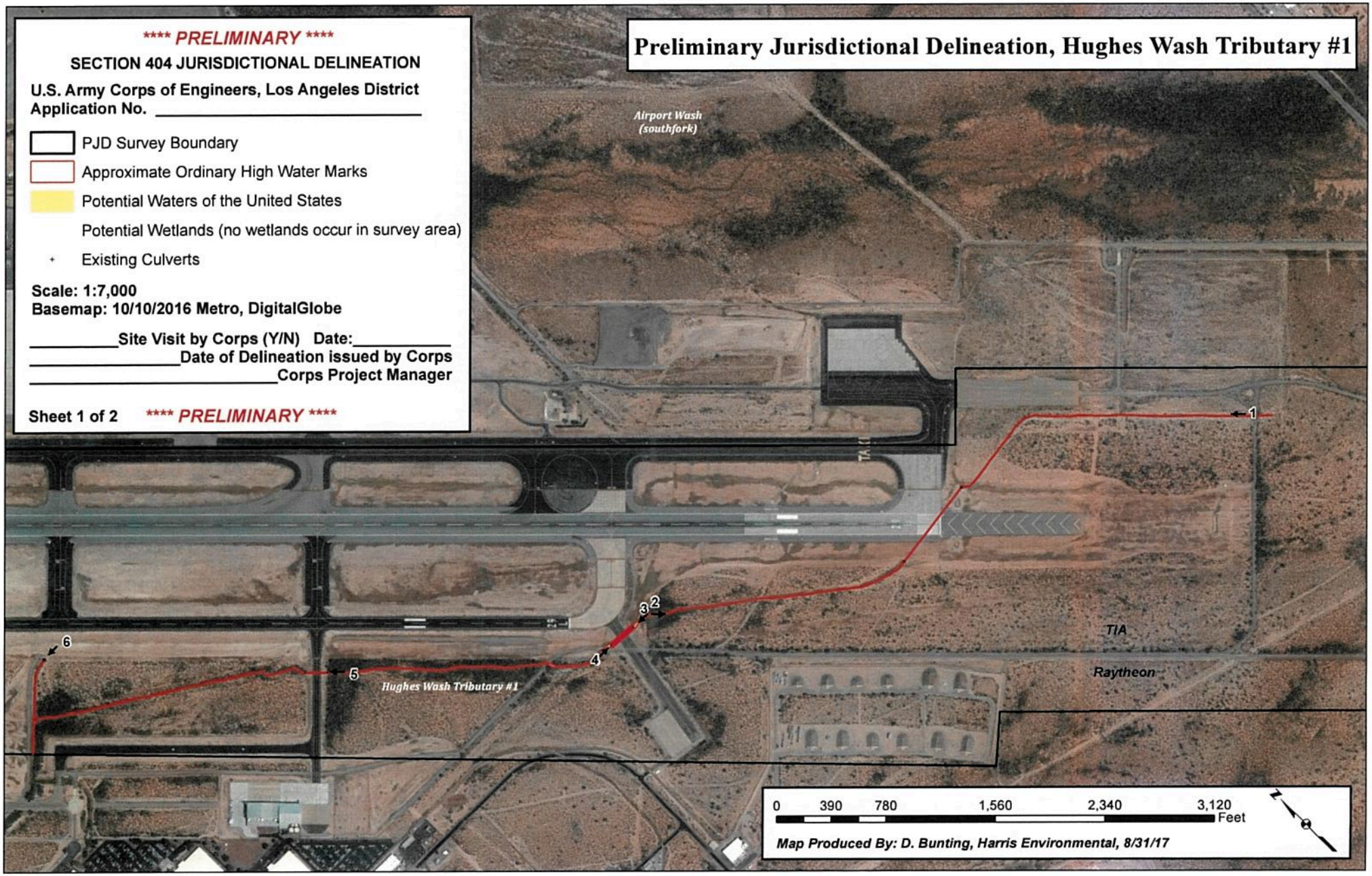
U.S. Army Corps of Engineers

Phone: (602) 230-6957, FAX 916-557-7803
Email: Kevin.W.Grove@usace.army.mil

If you only have questions regarding the appeal process you may also contact:
Thomas J. Cavanaugh
Administrative Appeal Review Officer
U.S. Army Corps of Engineers
South Pacific Division
1455 Market Street, 2052B
San Francisco, California 94103-1399
Phone: 415-503-6574, FAX 415-503-6646)
Email: Thomas.J.Cavanaugh@usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number: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U.S. Army Corps of Engineers, Los Angeles District
Application No. _____
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Potential Waters of the United States
Potential Wetlands (no wetlands occur in survey area)
Existing Culverts
Scale: 1:7,000
Basemap: 10/10/2016 Metro, DigitalGlobe
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_____Date of Delineation issued by Corps
_____Corps Project Manager
Sheet 1 of 2
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Preliminary Jurisdictional Delineation, Hughes Wash Tributary #1
Airport Wash (southfork)
1
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Hughes Wash Tributary #1
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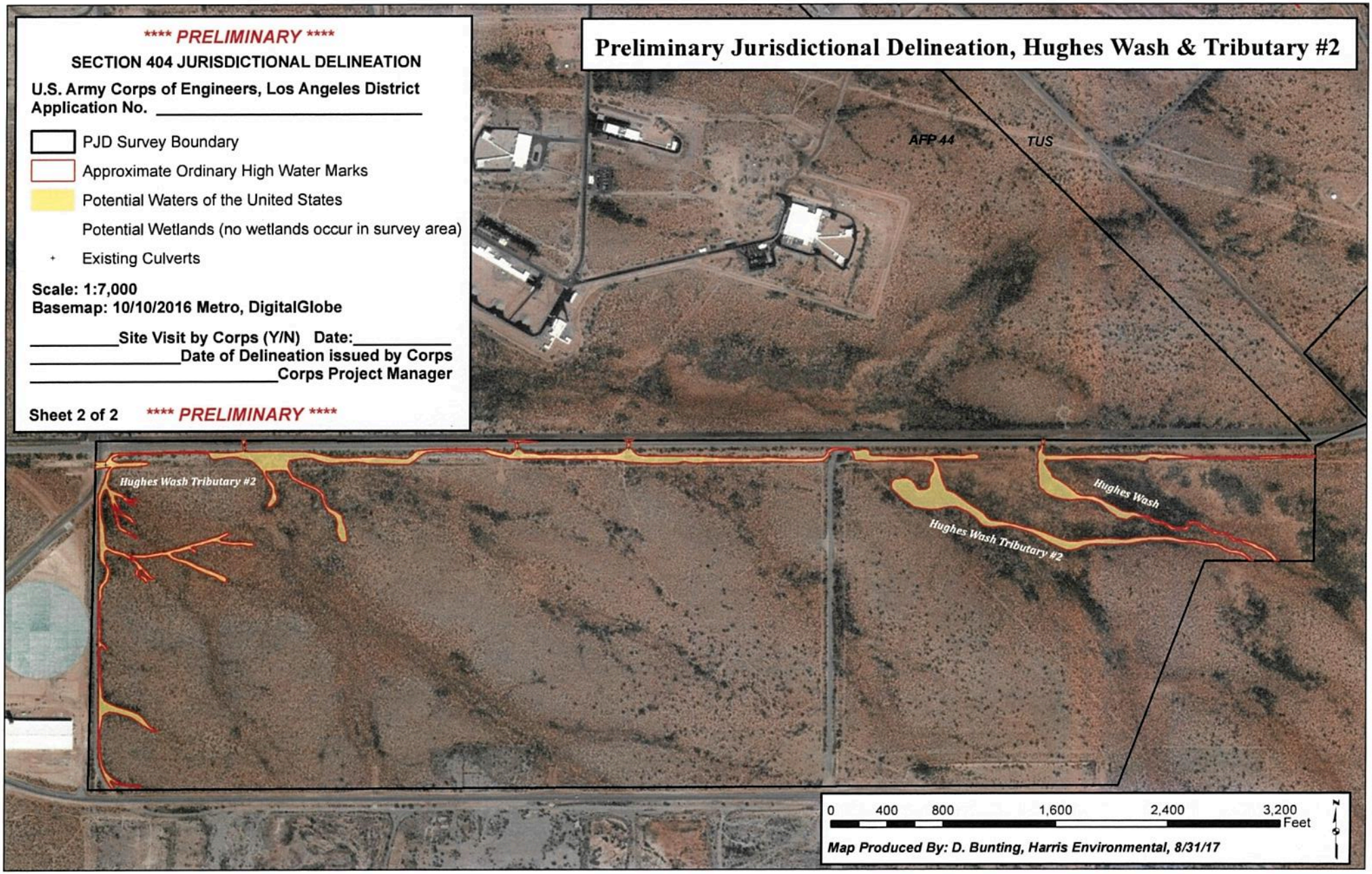
Raytheon
0 390 780 1,560 2,340 3,120 Feet
Map Produced By: D. Bunting, Harris Environmental, 8/31/17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Hughes Wash Tributary #2
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Map Produced By: D. Bunting, Harris Environmental, 8/31/17

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 #: | PJD Date: 6/29/17

State: | City/County: Tucson/Pima

Nearest Waterbody: Santa Cruz River

Location: TRS, LatLong or UTM: Township 15S, Range 14E, Sections 17, 18, 19, 20, 21, 28, 29, 32, & 33
32.11252 -110.93930 WGS 84

Name/ Address of Person Requesting PJD: Daniel Bunting
Harris Environmental Group, Inc.
650 N 6th Ave, Tucson, AZ 85716

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

Non-Wetland Waters: linear ft | width 17.57 acres | Stream Flow: Ephemeral

Wetlands: 0 acre(s) | Cowardin Class: N/A

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

☐ 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: Landrum & Brown
- ☑ 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: Tucson & Tucson SW
- ☐ 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): 10/10/2016 Metro, DigitalGlobe
  ☑ Other (Name & Date): Ground level photographs, June 29th, 2017
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

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.

Signature and Date of Regulatory Project Manager (REQUIRED)

12/5/2017
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.

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STORMWATER DRAINAGE PLAN

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STORMWATER DRAINAGE PLAN

PROPOSED AIRFIELD SAFETY ENHANCEMENT PROJECT ENVIRONMENTAL IMPACT STATEMENT

TUCSON INTERNATIONAL AIRPORT

Tucson, PIMA COUNTY, ARIZONA

Prepared by:
TYLIN International
60 East Rio Salado Parkway, Suite 501
Tempe, Arizona 85281

January 2018

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1.0 Introduction

The Federal Aviation Administration (FAA) issued a *Federal Register* Notice on August 19, 2016, announcing its intent to prepare an Environmental Impact Statement (EIS) for the Proposed Airfield Safety Enhancement Project (ASEP) including real property transactions at Tucson International Airport (TUS or Airport) in Pima County, Arizona (the Proposed Action).

The FAA is the lead federal agency for preparation of the EIS and will do so in compliance with National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), as well as FAA's policies and procedures for complying with NEPA found in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*. The FAA has invited the United States Air Force (USAF) and the National Guard Bureau (NGB) to participate as cooperating agencies as described under 40 CFR § 1501.6 and both have accepted FAA's invitation.

The Proposed Action includes the construction of a new air carrier runway parallel to the primary Runway 11L/29R. This new runway would replace the existing general aviation Runway 11R/29L. The purpose of the project is to enhance the safety of the airfield by eliminating areas in which risk of runway collision and incursion are heightened. Construction of an additional runway will simplify the current airfield's complex geometry, thus, enhancing the overall safety of the runway and its operations.

The key project elements include the following:

- Relocate Runway 11R/29L to the southwest and construct it to a total length of 10,996 feet and width of 150 feet
- Construct new full-length parallel taxiway between Runway 11L/29R and Runway 11R/29L
- Construct supporting connector taxiways between Runway 11R/29L and both outboard and centerline parallel taxiways
- Construct bypass taxiways for Runways 11L and 11R
- Closure of segments of taxiway A2 between taxiway A and Runway 3/21 and taxiway A2 and Runway 3/21
- Construct/maintain Arizona Air National Guard (AANG) extended blast pads for Runways 11L/29R and 11R/29L
- Construction of additional drainage detention areas to support additional impervious pavement areas
- Construction of replacement Earth Covered Magazines on U.S. Air Force Plant 44 (AFP 44)
- Construction of a Munitions Storage Area on land identified as "Parcel H" by the National Guard Bureau

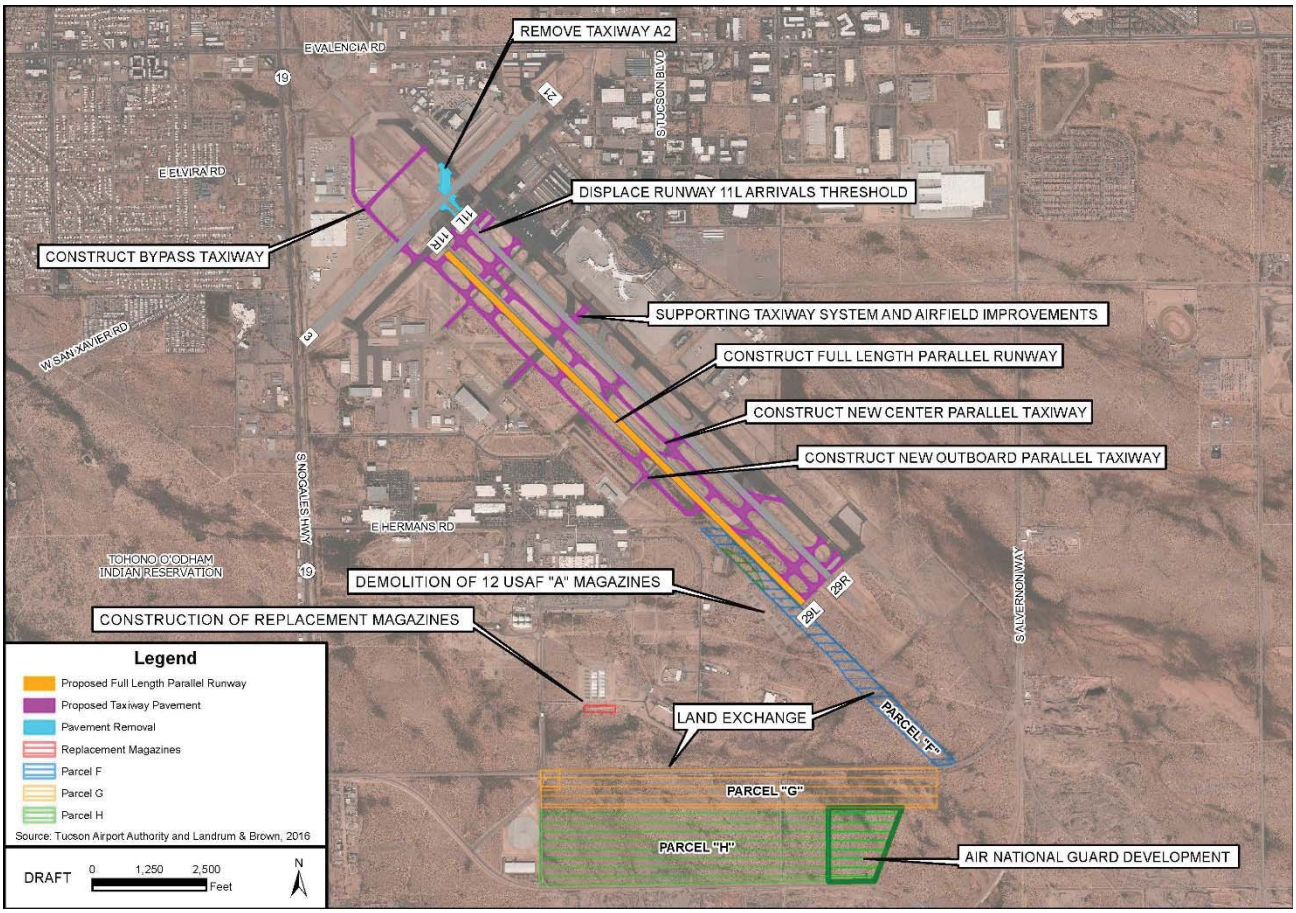

Figure-1: Proposed Airfield Improvements

This stormwater drainage plan is to be used by the FAA to document the conceptual design with recommendations of drainage improvements including conveyance facilities and detention basins to mitigate increases in runoff discharge and volumes associated with the Proposed Action.

1.1 Purpose of Report

This report focuses on development of conceptual drainage improvements in support of the Proposed Action. The report evaluates existing hydrologic conditions and develops a conceptual plan for stormwater management including an evaluation of pre versus post runoff conditions at offsite discharge locations. This report documents the conceptual design with recommendations of drainage improvements including conveyance facilities and detention basins to mitigate increases in runoff discharge and volumes.

1.2 Location

The Airport is located on 8,343 acres in Tucson, Arizona in Pima County south of the city of Tucson central business district. The Airport is near both Interstate 10 and Interstate 19. The United States Air Force (USAF) owned land, known as Air Force Plant 44 (AFP 44), is located along the southwest border of the Airport.

The Airport is bounded by Valencia Road (north), Alvernon Way (east), Aerospace Parkway (south) and Nogales Highway (west) within the city of Tucson, Arizona.

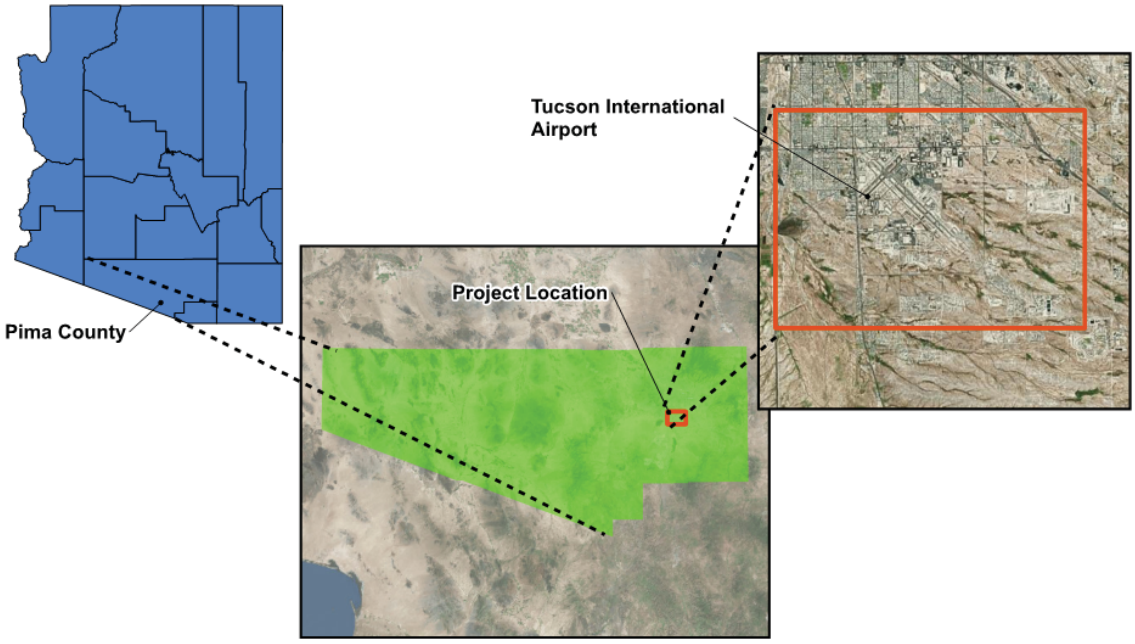

Figure-2: Location Map

2.0 Tucson International Airport

2.1 Existing Conditions

The TUS airfield is comprised of three runways; one set of close parallel runways separated by a distance of 706 feet (oriented in a northwest/southeast direction) and one crosswind runway (oriented in a northeast/southwest direction).

Parallel Runways 11L/29R and 11R/29L measure 10,996 feet long by 150 feet wide and 8,408-feet long by 75-feet wide, respectively. The crosswind runway, Runway 3/21, measures 7,000 feet long by 150-feet wide.

Runway 11L/29R is the primary runway at TUS and is the runway generally used by air carrier and military aircraft. During adverse wind conditions, air carrier and military aircraft occasionally use crosswind Runway 3/21. The crosswind runway is also used for convenience by General Aviation (GA) aircraft when conditions allow. Runway 11R/29L, originally built as a taxiway, has been converted to a runway primarily used by GA aircraft, due to its length and width.

The taxiway system provides aircraft access between the runways and the passenger terminal complex, general and corporate aviation areas, military facilities, airfreight terminals, and other aircraft parking areas.

There are five major drainages close to the Airport, Airport Wash, Valencia Wash, El Vado Wash, Santa Clara Wash, and Hughes Wash, all of which are part of the larger Santa Cruz River watershed. These washes are considered ephemeral streams because they only conduct water during and immediately following precipitation events. Perennial streams conduct water all year long and intermittent streams are dry for part of the year, but conduct water for periods longer than ephemeral streams. During a precipitation event, stormwater runoff from the Airport is conveyed by a system of manmade channels and culverts to these drainages, which flow from southeast to northwest toward the Santa Cruz River.

Airport Wash concentrates on the northeast side of the 11L/29R and the terminal area is conveyed around TUS via the Airport Wash channel, which ultimately discharges north of Valencia Road east of Park Avenue. Hughes Wash conveys flow to the southwest side of AFP 44 and ultimately discharges west of Nogales Highway south of Hermans Road.

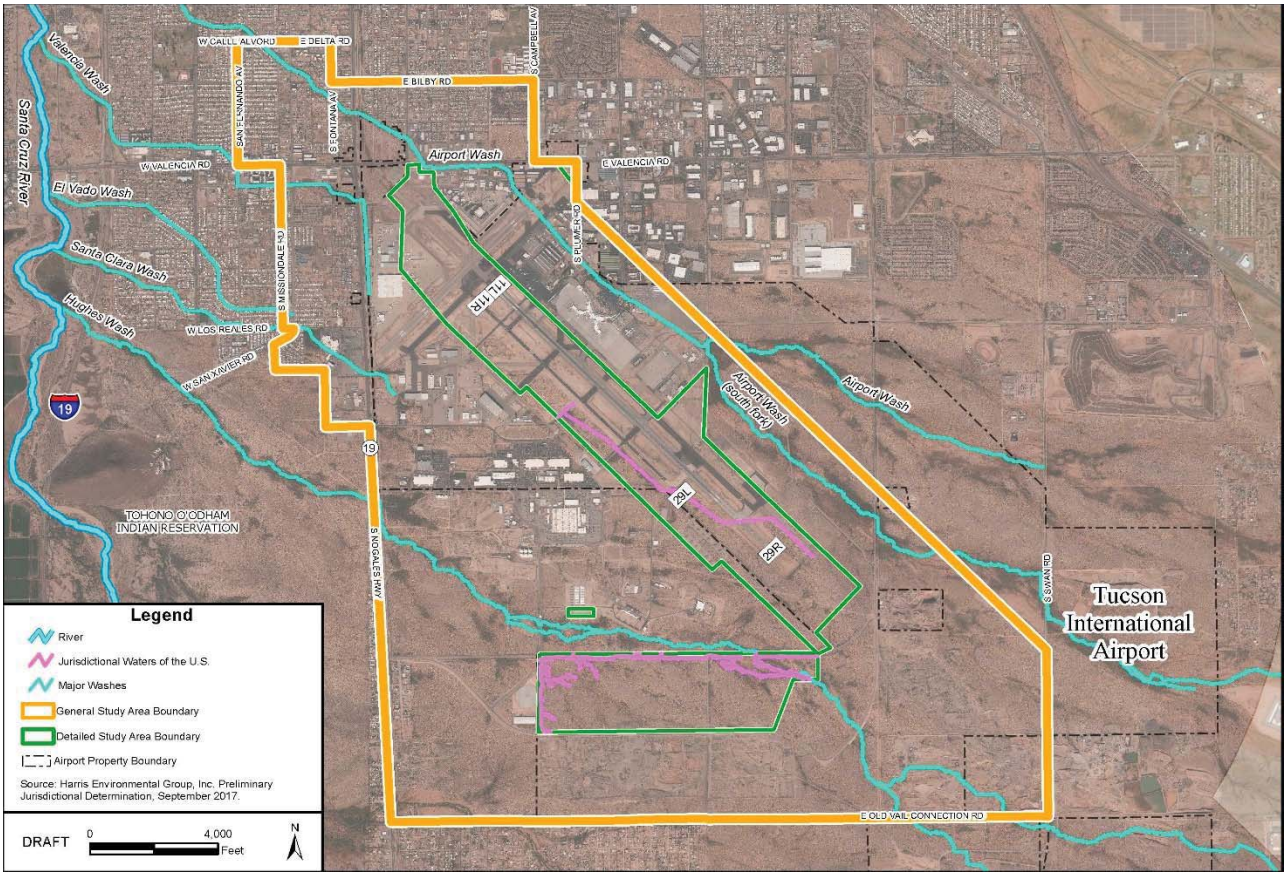

Figure-3: Offsite Drainage Flow Paths

Within the airfield, a smaller local watershed identified as the Airfield watershed collects and conveys onsite runoff from existing airport facilities and currently conveys and discharges stormwater runoff at a number of local outfalls located adjacent to the Nogales

Highway. Three existing culverted crossings of the railroad and the highway, between Valencia Road and Hermans Road, discharge flow to the west side of the Nogales Highway where the stormwater is typically conveyed within existing natural washes to the northwest toward the Santa Cruz River.

There are four areas where ponding may occur at the Airport during heavy rain events. These are: 1) within the airfield, 2) the area west of Bombardier Aerospace at the railroad, 3) the area west of the Triple Hangars at the railroad, and 4) within Airport Wash. Ponding on the airfield occurs between all runways and taxiways. The ponding is temporary in nature, and only occurs in a significant amount during storms with frequencies greater than 10 years.

2.2 Previous Studies

The following previous studies have developed existing conditions hydrology and hydraulics for the Airport area and were reviewed as part of this effort.

- *Airport Wide Drainage Basin Study (AWDBS). May 1992.*
- *Draft Airport Wide Drainage Basin Update. Stantec Consulting, Inc. August, 2004.* This report is an update of the original 1992 report to incorporate changes in land use, current agency requirements and revised Master Plan conditions.

3.0 Existing Conditions Hydrology

Offsite hydrologic analysis was not performed with this study. Instead, the results of a previous study (*Airport Wide Drainage Update Final Report* (Report), prepared by Stantec Consulting, Inc. 2004) was used. This report refers to some data from the *Airport Wide Drainage Basin Study* (AWDBS) completed in May 1992, while providing additional modeling results and updated analysis.

In the 2004 study, U.S. Army Corps of Engineers (USACE) HEC-1, Flood Hydrograph Package computer program was used to determine the stormwater runoff discharges of the existing airport conditions for the 2, 5, 10 and 100-year return periods. At the time, the HEC-1 model was used in place of the standard Pima County hydrology methodology because of the nature of the contributing watersheds. The HEC-1 model was used to account for the extensive ponding throughout the watershed, which largely affects the peak discharges.

3.1 Existing Conditions

Per the 2004 report, several watersheds contribute to the study area or adjacent surrounding areas. These watersheds are the Airport Wash, Hughes Wash and the Airfield Wash watersheds.

3.2 Previous Study Model Results

The existing airfield drainage facilities have generally been designed in accordance with the FAA guidelines. FAA Advisory Circular AC 150/5320-5B, “Airport Drainage,” July 1970 recommends that airfield drainage facilities be designed for the 5-year frequency storm runoff. Per the results, the peak 5-year baseline flows from the site is listed as 222 cubic feet per second (cfs). The detention basin volume shown in Table 3.2 is indicated as future development within the Stantec report.

Table 3.2 – Airfield Discharge

	Storm Frequency	Baseline Flow	Post-Development Flow	Detention Basin Volume
		[cfs]	[cfs]	[ac.-ft.]
Airfield Watershed (Point C)	2	108	152	4
	5	222	305	4
	10	322	379	5
	100	904	981	5

Notes: 1) Hydrology modeled using HEC-1 hydrographs and stage-storage-discharge relationships.
2) Uncertain if detention basins were constructed. Listed as ‘future’ development in the Stantec report (2004).
3) Results in table based upon ‘on-line’ detention basins in Airfield Wash and 20% oversizing.

3.3 Airfield Wash Hydrology

There are six distinct stormwater outfalls from the Airfield Wash watershed (see Exhibit 5 in Appendix C). Each of these outfalls has a distinct drainage area contributing stormwater runoff. These six subbasins of Airfield wash are analyzed to determine the peak discharges reaching each outfall. The City of Tucson's hydrologic method was used to develop onsite discharges with the following results.

Table 3.3 – Airfield Watershed Existing Conditions Subbasin Discharge

Drainage Areas	Outfall Location	Contributing Area	Weighted Runoff C	5-year Discharge	100-year Discharge
		[acres]		[cfs]	[cfs]
1	Valencia Road to Airport Wash	41.8	0.73	27.4	78.4
2	Nogales Hwy to El Vado Wash	160.9	0.85	95.1	271.6
3	Nogales Hwy to Santa Clara Wash	77.3	0.80	40.2	115.0
4	Nogales Hwy to Santa Clara Wash	618.7	0.78	165.9	474.0
5	Hermans Road to Hughes Wash	593.3	0.77	119.5	341.3
6	Hermans Road to Hughes Wash	64.8	0.86	40.2	114.9

The results of the existing conditions analysis determine the base flow rate which are not to be exceeded by proposed conditions in the Proposed Action.

4.0 Hydrology

4.1 Design Criteria

Section 1.5 of the AWDB-Update designates that future drainage facilities be designed in accordance with the following City of Tucson, Pima County and FAA guidelines:

- Detention basins will hold runoff for a period of time before releasing it to downstream facilities, and must drain within 24-hours per Pima County DOT & Flood Control District (FCD) regulations. *The basins will be designed such that post-development 2, 5, 10 & 100-year peak flows from the site will not exceed the predevelopment values*.
- Detention volumes in onsite ponding areas and detention basins will bleed-off flow such that the basins will drain within 24-hours.
- Per FAA guidelines, future onsite drainage facilities mush have capacity for the 5-year frequency storm runoff. Additionally, temporary ponding from storms with a return period of 10-years will be checked for encroachment into the runway and taxiway safety areas. Ponding in the airfield is allowed only as a result of runoff exceeding the 5-year design capacity. Detention basins within the runway and taxiways safety areas will not be allowed. Temporary or short term ponding in the airfield caused by runoff from rainfall events greater than the 5-year event must drain within 24-hours.
- Detention basins shall be located as far from runways as possible.
- Buildings, structures and adjacent facilities shall be protected from the 100-year frequency storm runoff.
- No changes in drainage patterns impacting downstream areas will be allowed.

4.2 Proposed Airfield Improvements

The Proposed Action includes construction of a full length parallel runway designated 11R/29L, a new center parallel taxiway, new outboard parallel taxiway, addition of supporting and bypass taxiway systems (see Figure 1). These improvements are entirely located within the Airfield Wash watershed and constitute an overall increase in the total impervious area located within the watershed resulting in a net increase in stormwater runoff discharge and volume.

The nature of the improvements can be observed by comparing the existing onsite development shown in Exhibit 5 with the proposed shown in Exhibit 6 in Appendix C. The change in land use can be classified into three categories:

- Impervious which is now pervious, resulting from the removal of an impervious surface
- Pervious which is now impervious, resulting from the addition of new impervious surfaces; and
- Impervious which will remain impervious, resulting from a modification in the Proposed Action but from one impervious surface to another.

The net increase in impervious surface is approximately 80 acres which is primarily split between subbasins 4 and 5. Subbasins 1, 2 and 6 were essentially unchanged while subbasin 3, although modified, resulted in a zero-net change in impervious surface.

4.3 Proposed Onsite Hydrologic Conditions

The six subbasins which make up the Airfield Wash watershed have been modified to reflect physical changes to the existing conditions. The proposed conditions drainage boundaries are adjusted to account for changes in contributing watershed based upon the runway and taxiway configuration (see Exhibit 6 in Appendix C).

The drainage analysis follows the guidelines within the *Standards Manual for Drainage Design and Floodplain Management in Tucson, Arizona, July 1998* (Tucson Drainage Manual). A base rainfall intensity found in the Tucson Drainage Manual was used to calculate 100-year discharges. Other storm frequencies were determined using a factor found in Table 4.5. This methodology applies a weighted runoff coefficient by soils and land use categories, a rainfall intensity based upon NOAA 14 rainfall data and the contributing area. The following results are documented in the calculations:

Table 4.3a – Airfield Watershed Proposed Conditions Subbasin Discharge

Drainage Areas	Outfall Location	Contributing Area	Weighted Runoff C	5-year Discharge	100-year Discharge
		[acres]		[cfs]	[cfs]
1	Valencia Road to Airport Wash	41.8	0.73	27.4	78.4
2	Nogales Hwy to El Vado Wash	160.9	0.85	95.1	271.6
3	Nogales Hwy to Santa Clara Wash	77.3	0.80	40.2	115.0
4	Nogales Hwy to Santa Clara Wash	588.8	0.83	173.3	495.0
5	Hermans Road to Hughes Wash	623.1	0.81	135.6	387.3
6	Hermans Road to Hughes Wash	64.8	0.86	40.2	114.9

It is important to note that the rational methodology in the Tucson Drainage Manual does not account for retention/detention. Retention/Detention is handled external to the runoff calculations.

The net change in impervious area is calculated and reported as approximately 80 acres. In order to attenuate the increase in stormwater runoff (both discharge and volume) due to the Proposed Action, stormwater storage is needed within the Airfield watershed to attenuate both the discharge and the volume of runoff released from the watershed. Table 4.3b summarizes the change in 5 and d100-year discharges.

Table 4.3b – Pre vs. Post Discharges

	Existing Conditions				Proposed Conditions			
Drainage Areas	**Contributing Area**	**Weighted Runoff C**	**5-year Discharge**	**100-year Discharge**	**Contributing Area**	**Weighted Runoff C**	**5-year Discharge**	**100-year Discharge**
	[acres]		[cfs]	[cfs]	[acres]		[cfs]	[cfs]
1	41.8	0.73	27.4	78.4	41.8	0.73	27.4	78.4
2	160.9	0.85	95.1	271.6	160.9	0.85	95.1	271.6
3	77.3	0.8	40.2	115.0	77.3	0.8	40.2	115.0
4	618.7	0.78	165.9	474.0	588.8	0.83	173.3	495.0
5	593.3	0.77	119.5	341.3	623.1	0.81	135.6	387.3
6	64.8	0.85	40.2	114.9	64.8	0.86	40.2	114.9

Subbasins 1, 2, 3 and 6 have no appreciable increase in stormwater runoff. However, subbasins 4 and 5 increase for both the 5 and 100-year discharge.

Table 4.3c – Change in Discharges

	Existing Conditions		Proposed Conditions			
Drainage Areas	**5-year Discharge**	**100-year Discharge**	**5-year Discharge**	**100-year Discharge**	**5-year change**	**100-year change**
	[cfs]	[cfs]	[cfs]	[cfs]	[cfs]	[cfs]
1	27.4	78.4	27.4	78.4	0.0	0.0
2	95.1	271.6	95.1	271.6	0.0	0.0
3	40.2	115	40.2	115.0	0.0	0.0
4	165.9	474	173.3	495.0	7.4	21.0
5	119.5	341.3	135.6	387.3	16.1	46.0
6	40.2	114.9	40.2	114.9	0.0	0.0

5.0 Hydraulics

5.1 Proposed Drainage Improvements

In many respects the airfield drainage after the implementation of the Proposed Action will be similar to existing conditions in that stormwater will still collect in the infield areas between the runways and taxiways. However, the collection system to convey the stormwater away from the airfield will, by necessity, be revised to meet the needs of the airfield improvements.

There are currently two outfalls for stormwater runoff within the airfield. These are:

1. An existing channel located approximately mid-field near Aero Park Boulevard conveys stormwater runoff southwesterly and discharges to a retention/detention area on the south side of Hermans Road adjacent to Nogales Highway. This discharges to Hughes Wash (Subbasin 5).
2. An existing channel located near the norther end of the airfield, south of and nearly adjacent to runway 3/21. This channel conveys flow westerly to an existing crossing of Nogales Highway located approximately 1500-feet south of Los Reales Road (Subbasin 4).

The proposed drainage concept (see Exhibit 6 in Appendix C) connects the infield areas between the runways and taxiways using culverted crossings and discharge to the two existing conveyance channels. New in-line detention facilities would be located within open/available spaces to mitigate discharges to acceptable pre-project rates to meet drainage design guidelines.

5.2 Pipe Culverts

In order to accommodate and effectively convey the onsite flows through the infield areas of the airfield, pipe culverts would be required to route stormwater through the infield areas. The size, length, and dimensions of the pipe are determined based upon the conveyance of the accumulated 5-year discharge reaching each culvert. The pipe material would be determined based upon available cover and airport loading over the top of the pipe. It is recommended that Class V rubber gasket reinforced concrete pipe (RGRCP), or a suitable material able to withstand aircraft loading, be used with a minimum of 3-feet cover.

Local onsite hydrology methods were used to determine the discharge based upon an accumulating contributing watershed and a lengthening time of concentration. These local discharges determine the required conveyance capacity for culverts located within subbasins 4 and 5 (see table 5.2).

Table 5.2 – Culvert Summary

Subbasin ID	Culvert ID	5-year Discharge [cfs]	Culvert Diameter [inches]
4	C-1	7.8	18
4	C-2	9.7	24
4	C-3	15.3	24
4	C-4	18.7	24
4	C-5	21.8	30
4	C-6	8.1	18
4	C-7	8.8	18
4	C-8	18.7	30
4	C-9	13.5	24
4	C-10	17.1	24
4	C-11	19.7	24
4	C-12	11.8	24
4	C-13	20.7	24
4	C-14	31.1	30
4	C-15	62.9	42

Subbasin ID	Culvert ID	5-year Discharge [cfs]	Culvert Diameter [inches]
5	C-16	6.2	18
5	C-17	12.1	24
5	C-18	8.2	18
5	C-19	14.6	24
5	C-20	27.1	30
5	C-21	29.1	30
5	C-22	34.3	30
5	C-23	14.2	24
5	C-24	12	24
5	C-25	27.2	30
5	C-26	0.2	24
5	C-27	58.1	42
-	-	-	-
-	-	-	-
-	-	-	-

Per the drainage design guidelines in Section 4.1, culverts shall have, at a minimum, the ability to convey the 5-year discharge. The 10-year is allowed to temporarily pond as long as stormwater does not pond into the runway or taxiways. This is an important distinction and special care should be taken during final design to ensure that the culverts are sized properly to meet both criteria.

Culverts can also become blocked due to debris, so regular maintenance should be performed. A minimum pipe diameter should be considered (recommend at least 24-inches in diameter) so that the culverts are less susceptible to debris blockage. Upsizing the culvert diameter a half size (6-inches) should also be considered if regular maintenance is problematic.

5.3 Channels

The existing channels identified in Section 5.1 have been evaluated for capacity based upon a rough estimate of top and bottom width, sideslope, depth and longitudinal slope. The channel segments may need to be enlarged depending upon existing capacity, proposed conveyance, and detention basin location.

Based upon existing conditions, it is estimated that the existing channel network has capacity for between a 5 and 10-year storm event based upon physical location, dimensions depth and longitudinal slope. Stormwater runoff in excess of the capacity of

the channel would sheet flow generally following the slope of the terrain and between built up areas.

In some areas the channel is relatively clean with a consistent trapezoidal shape. In other areas the channels are roughly graded with varying levels of vegetation. The capacity of the existing channel could be improved through maintenance by removing dense sections of vegetation in multiple reaches. Channel capacity could also be improved by consistent grading and dimensioning of the channel shape and slope.

5.4 Detention Basins

The City of Tucson's method for developing pre and post conditions hydrographs was used to determine the required storage volume necessary to attenuate the peak runoff discharge to that of existing conditions. Calculations are provided in Appendix A and B.

The net change in impervious area was determined through review of changes in the Land Use as described in Section 4.2. Other adjustments include a change in the contributing drainage area within each subbasin based upon modifications to the flow patterns within the runway and taxiway areas. The resulting hydrographs were reviewed to determine the additional volume (as the area under the curve) between the existing and proposed conditions runoff.

The storage volume necessary to attenuate the 100-year onsite flows due to the Proposed Action were calculated to be **11.6 acre-feet** split between subbasins 4 and 5 as 0.8 acre-feet and 10.8 acre-feet respectively. The storage volume provided by the proposed detention basins would be up to **31.1 acre-feet** split between subbasins 4 and 5 as 20.1 acre-feet and 11.0 acre-feet respectively.

Therefore, the three proposed detention basins (see Exhibit 7) would effectively attenuate the stormwater discharge and volume as a result of the Proposed Action.

The detention basins would be designed with a positive slope to the outfall, which will allow for release of detained flow such that the basins will discharge all runoff within a 24-hour period. Adjustments to size, shape, and location of the proposed detention basins would be made during final design to avoid utilities or other existing or planned obstacles. However, it is important to maintain the connectivity between the collection and delivery channels /pipes which bring stormwater to the basins, and then from the basins downstream conveyance to the outfalls.

The FAA has confirmed the preliminary layout of the basins would be acceptable as long as they are clear of the appropriate runway safety areas (ROFA, RSA, etc.). Specifically, FAA must ensure the basins are out the new south parallel taxiway safety area and the Obstacle Free Area (OFA).

6 References

1. *Airport Wide Drainage Basin Study (AWDBS). May 1992.*
2. *Draft Airport Wide Drainage Basin Update. Stantec Consulting, Inc. August, 2004.*
3. Standards Manual for Drainage Design and Floodplain Management in Tucson, Arizona. City of Tucson. December 1989.
4. Stormwater Detention/Retention Manual. Pima County Department of Transportation and Flood Control.
5. Airport Drainage, Federal Aviation Authority – AC 150/5320-5B. July 1970.

Appendix A – Onsite Calculations

Appendix A.1 – NOAA Atlas 14

NOAA Atlas 14, Volume 1, Version 5
Location name: Tucson, Arizona, USA*
Latitude: 32.1192°, Longitude: -110.9428°
Elevation: 2592.28 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.252 (0.226-0.284)	0.324 (0.291-0.366)	0.428 (0.382-0.481)	0.507 (0.449-0.569)	0.614 (0.537-0.687)	0.695 (0.599-0.779)	0.779 (0.661-0.877)	0.862 (0.720-0.975)	0.974 (0.792-1.11)	1.06 (0.844-1.22)
10-min	0.383 (0.344-0.433)	0.493 (0.443-0.558)	0.651 (0.580-0.732)	0.772 (0.682-0.866)	0.935 (0.816-1.05)	1.06 (0.912-1.19)	1.19 (1.01-1.34)	1.31 (1.10-1.49)	1.48 (1.21-1.69)	1.61 (1.28-1.85)
15-min	0.475 (0.426-0.536)	0.611 (0.549-0.692)	0.808 (0.719-0.908)	0.956 (0.846-1.07)	1.16 (1.01-1.30)	1.31 (1.13-1.47)	1.47 (1.25-1.66)	1.63 (1.36-1.84)	1.84 (1.49-2.10)	2.00 (1.59-2.30)
30-min	0.639 (0.574-0.722)	0.823 (0.739-0.931)	1.09 (0.969-1.22)	1.29 (1.14-1.45)	1.56 (1.36-1.74)	1.77 (1.52-1.98)	1.98 (1.68-2.23)	2.19 (1.83-2.48)	2.48 (2.01-2.82)	2.69 (2.14-3.09)
60-min	0.791 (0.710-0.894)	1.02 (0.914-1.15)	1.35 (1.20-1.51)	1.59 (1.41-1.79)	1.93 (1.69-2.16)	2.19 (1.88-2.45)	2.45 (2.08-2.76)	2.71 (2.26-3.07)	3.06 (2.49-3.50)	3.33 (2.65-3.83)
2-hr	0.917 (0.827-1.03)	1.17 (1.06-1.32)	1.52 (1.37-1.70)	1.79 (1.59-2.00)	2.17 (1.91-2.41)	2.46 (2.14-2.73)	2.76 (2.36-3.07)	3.06 (2.57-3.42)	3.48 (2.84-3.92)	3.79 (3.04-4.32)
3-hr	0.973 (0.877-1.09)	1.23 (1.11-1.38)	1.58 (1.42-1.77)	1.86 (1.66-2.08)	2.25 (1.98-2.50)	2.55 (2.22-2.84)	2.88 (2.45-3.22)	3.21 (2.68-3.61)	3.69 (2.98-4.19)	4.06 (3.20-4.66)
6-hr	1.10 (0.993-1.24)	1.38 (1.24-1.55)	1.73 (1.55-1.94)	2.03 (1.80-2.26)	2.43 (2.13-2.71)	2.75 (2.38-3.07)	3.09 (2.63-3.45)	3.44 (2.88-3.86)	3.93 (3.19-4.45)	4.33 (3.45-4.95)
12-hr	1.24 (1.12-1.38)	1.55 (1.41-1.73)	1.93 (1.73-2.15)	2.23 (2.00-2.48)	2.66 (2.35-2.95)	2.99 (2.61-3.33)	3.33 (2.86-3.72)	3.68 (3.11-4.14)	4.16 (3.43-4.72)	4.54 (3.67-5.20)
24-hr	1.39 (1.28-1.53)	1.74 (1.60-1.91)	2.17 (1.99-2.38)	2.52 (2.30-2.77)	3.00 (2.72-3.30)	3.38 (3.04-3.72)	3.78 (3.36-4.18)	4.18 (3.68-4.65)	4.74 (4.11-5.33)	5.17 (4.43-5.86)
2-day	1.52 (1.40-1.67)	1.90 (1.75-2.09)	2.37 (2.18-2.60)	2.76 (2.52-3.02)	3.28 (2.99-3.60)	3.70 (3.33-4.07)	4.14 (3.69-4.57)	4.58 (4.05-5.10)	5.19 (4.51-5.85)	5.67 (4.85-6.46)
3-day	1.62 (1.49-1.77)	2.02 (1.86-2.22)	2.53 (2.32-2.77)	2.95 (2.69-3.23)	3.54 (3.21-3.88)	4.02 (3.61-4.42)	4.52 (4.02-5.01)	5.05 (4.43-5.63)	5.79 (4.97-6.53)	6.39 (5.39-7.28)
4-day	1.71 (1.58-1.88)	2.14 (1.96-2.35)	2.68 (2.45-2.94)	3.14 (2.86-3.44)	3.80 (3.43-4.17)	4.34 (3.88-4.78)	4.91 (4.34-5.44)	5.52 (4.81-6.16)	6.40 (5.43-7.22)	7.11 (5.92-8.11)
7-day	1.97 (1.81-2.17)	2.46 (2.25-2.71)	3.10 (2.83-3.41)	3.64 (3.31-4.00)	4.42 (3.98-4.87)	5.06 (4.51-5.60)	5.76 (5.07-6.41)	6.50 (5.64-7.30)	7.57 (6.42-8.62)	8.45 (7.04-9.74)
10-day	2.21 (2.02-2.42)	2.75 (2.52-3.02)	3.45 (3.14-3.78)	4.03 (3.67-4.42)	4.86 (4.38-5.34)	5.54 (4.94-6.11)	6.27 (5.52-6.95)	7.04 (6.11-7.88)	8.14 (6.90-9.22)	9.04 (7.52-10.4)
20-day	2.88 (2.65-3.15)	3.60 (3.30-3.94)	4.51 (4.12-4.93)	5.25 (4.78-5.73)	6.27 (5.67-6.85)	7.08 (6.34-7.76)	7.92 (7.02-8.73)	8.81 (7.71-9.78)	10.0 (8.61-11.3)	11.0 (9.29-12.5)
30-day	3.50 (3.24-3.80)	4.36 (4.03-4.74)	5.38 (4.96-5.84)	6.19 (5.69-6.71)	7.27 (6.64-7.90)	8.10 (7.36-8.83)	8.95 (8.07-9.80)	9.81 (8.76-10.8)	11.0 (9.64-12.2)	11.9 (10.3-13.3)
45-day	4.26 (3.95-4.61)	5.30 (4.92-5.74)	6.47 (6.00-7.00)	7.35 (6.81-7.96)	8.49 (7.83-9.20)	9.32 (8.55-10.1)	10.1 (9.25-11.0)	10.9 (9.89-11.9)	11.9 (10.7-13.1)	12.6 (11.2-14.0)
60-day	4.83 (4.47-5.22)	6.01 (5.56-6.51)	7.33 (6.78-7.93)	8.33 (7.69-9.01)	9.62 (8.85-10.4)	10.6 (9.69-11.5)	11.5 (10.5-12.5)	12.4 (11.2-13.6)	13.5 (12.1-15.0)	14.3 (12.7-16.0)

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

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

Please refer to NOAA Atlas 14 document for more information.

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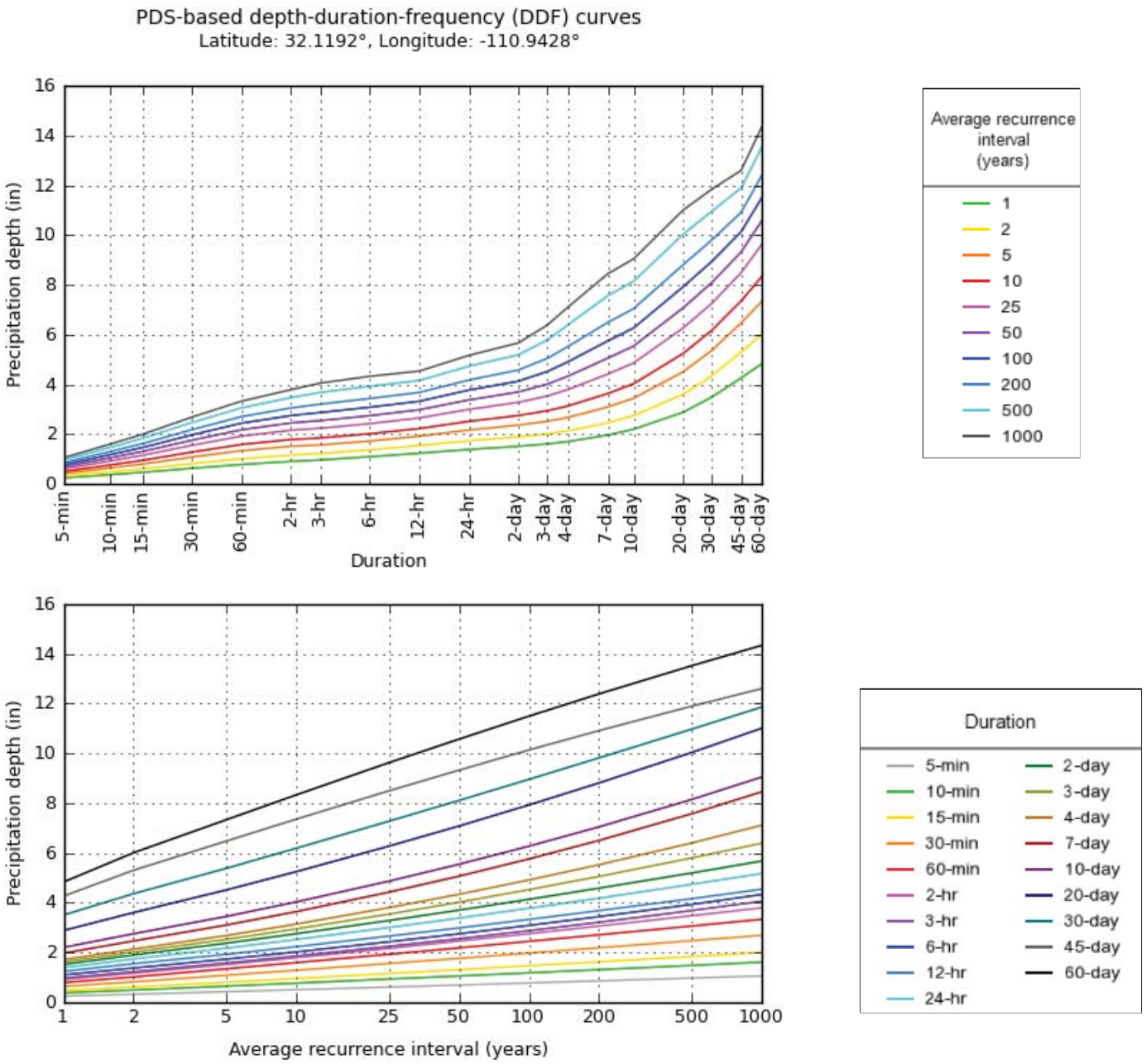
PF graphical



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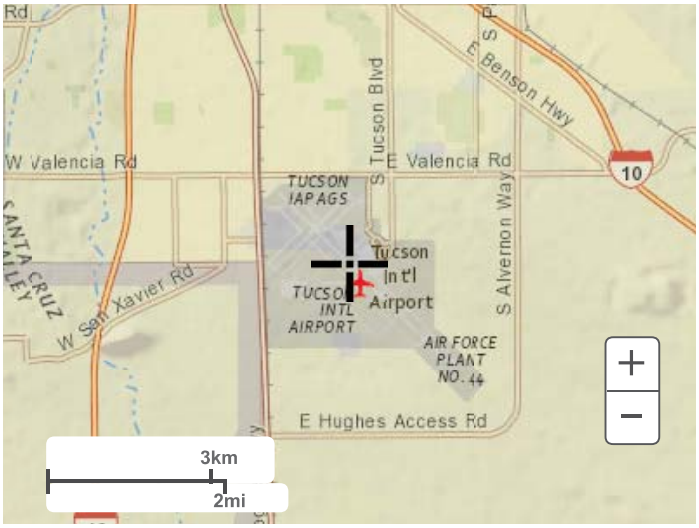
Small scale terrain



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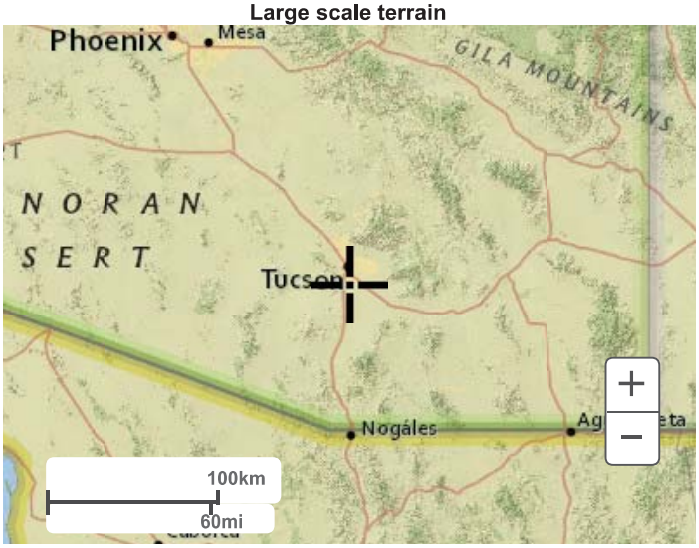

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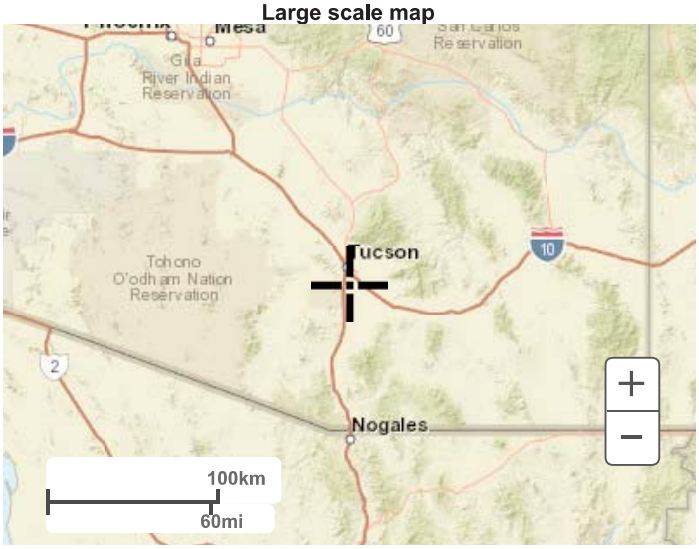
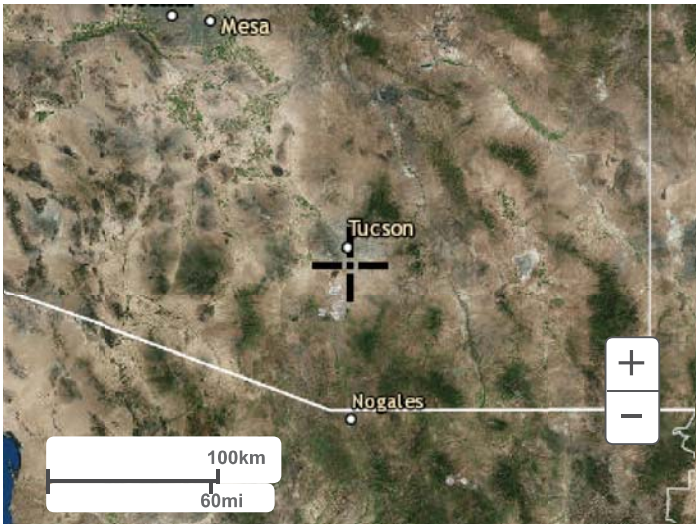


Large scale aerial



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Silver Spring, MD 20910
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Location name: Tucson, Arizona, USA*
Latitude: 32.1192°, Longitude: -110.9428°
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POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	3.02 (2.71-3.41)	3.89 (3.49-4.39)	5.14 (4.58-5.77)	6.08 (5.39-6.83)	7.37 (6.44-8.24)	8.34 (7.19-9.35)	9.35 (7.93-10.5)	10.3 (8.64-11.7)	11.7 (9.50-13.3)	12.7 (10.1-14.6)
10-min	2.30 (2.06-2.60)	2.96 (2.66-3.35)	3.91 (3.48-4.39)	4.63 (4.09-5.20)	5.61 (4.90-6.27)	6.35 (5.47-7.12)	7.11 (6.04-8.01)	7.87 (6.57-8.91)	8.90 (7.23-10.2)	9.68 (7.70-11.1)
15-min	1.90 (1.70-2.14)	2.44 (2.20-2.77)	3.23 (2.88-3.63)	3.82 (3.38-4.29)	4.64 (4.05-5.18)	5.24 (4.52-5.88)	5.88 (4.99-6.62)	6.51 (5.43-7.36)	7.35 (5.97-8.39)	8.00 (6.37-9.18)
30-min	1.28 (1.15-1.44)	1.65 (1.48-1.86)	2.18 (1.94-2.45)	2.58 (2.28-2.89)	3.12 (2.73-3.49)	3.53 (3.04-3.96)	3.96 (3.36-4.46)	4.38 (3.66-4.96)	4.95 (4.02-5.65)	5.39 (4.29-6.18)
60-min	0.791 (0.710-0.894)	1.02 (0.914-1.15)	1.35 (1.20-1.51)	1.59 (1.41-1.79)	1.93 (1.69-2.16)	2.19 (1.88-2.45)	2.45 (2.08-2.76)	2.71 (2.26-3.07)	3.06 (2.49-3.50)	3.33 (2.65-3.83)
2-hr	0.458 (0.414-0.515)	0.586 (0.528-0.658)	0.761 (0.682-0.852)	0.897 (0.796-1.00)	1.08 (0.954-1.21)	1.23 (1.07-1.37)	1.38 (1.18-1.54)	1.53 (1.29-1.71)	1.74 (1.42-1.96)	1.90 (1.52-2.16)
3-hr	0.324 (0.292-0.363)	0.409 (0.369-0.460)	0.524 (0.472-0.589)	0.618 (0.551-0.692)	0.748 (0.659-0.834)	0.849 (0.738-0.946)	0.958 (0.816-1.07)	1.07 (0.893-1.20)	1.23 (0.992-1.39)	1.35 (1.07-1.55)
6-hr	0.184 (0.166-0.206)	0.230 (0.207-0.258)	0.289 (0.259-0.324)	0.338 (0.301-0.378)	0.406 (0.356-0.453)	0.459 (0.398-0.512)	0.516 (0.439-0.576)	0.575 (0.481-0.644)	0.656 (0.533-0.742)	0.723 (0.575-0.826)
12-hr	0.103 (0.093-0.115)	0.129 (0.117-0.144)	0.160 (0.144-0.178)	0.185 (0.166-0.206)	0.221 (0.195-0.245)	0.248 (0.217-0.276)	0.276 (0.238-0.309)	0.306 (0.258-0.344)	0.345 (0.285-0.392)	0.377 (0.305-0.432)
24-hr	0.058 (0.053-0.064)	0.073 (0.067-0.080)	0.091 (0.083-0.099)	0.105 (0.096-0.115)	0.125 (0.113-0.138)	0.141 (0.127-0.155)	0.157 (0.140-0.174)	0.174 (0.153-0.194)	0.197 (0.171-0.222)	0.215 (0.184-0.244)
2-day	0.032 (0.029-0.035)	0.040 (0.036-0.043)	0.049 (0.045-0.054)	0.057 (0.053-0.063)	0.068 (0.062-0.075)	0.077 (0.069-0.085)	0.086 (0.077-0.095)	0.095 (0.084-0.106)	0.108 (0.094-0.122)	0.118 (0.101-0.135)
3-day	0.022 (0.021-0.025)	0.028 (0.026-0.031)	0.035 (0.032-0.038)	0.041 (0.037-0.045)	0.049 (0.045-0.054)	0.056 (0.050-0.061)	0.063 (0.056-0.070)	0.070 (0.061-0.078)	0.080 (0.069-0.091)	0.089 (0.075-0.101)
4-day	0.018 (0.016-0.020)	0.022 (0.020-0.024)	0.028 (0.026-0.031)	0.033 (0.030-0.036)	0.040 (0.036-0.043)	0.045 (0.040-0.050)	0.051 (0.045-0.057)	0.058 (0.050-0.064)	0.067 (0.057-0.075)	0.074 (0.062-0.084)
7-day	0.012 (0.011-0.013)	0.015 (0.013-0.016)	0.018 (0.017-0.020)	0.022 (0.020-0.024)	0.026 (0.024-0.029)	0.030 (0.027-0.033)	0.034 (0.030-0.038)	0.039 (0.034-0.043)	0.045 (0.038-0.051)	0.050 (0.042-0.058)
10-day	0.009 (0.008-0.010)	0.011 (0.010-0.013)	0.014 (0.013-0.016)	0.017 (0.015-0.018)	0.020 (0.018-0.022)	0.023 (0.021-0.025)	0.026 (0.023-0.029)	0.029 (0.025-0.033)	0.034 (0.029-0.038)	0.038 (0.031-0.043)
20-day	0.006 (0.006-0.007)	0.008 (0.007-0.008)	0.009 (0.009-0.010)	0.011 (0.010-0.012)	0.013 (0.012-0.014)	0.015 (0.013-0.016)	0.017 (0.015-0.018)	0.018 (0.016-0.020)	0.021 (0.018-0.024)	0.023 (0.019-0.026)
30-day	0.005 (0.004-0.005)	0.006 (0.006-0.007)	0.007 (0.007-0.008)	0.009 (0.008-0.009)	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.012 (0.011-0.014)	0.014 (0.012-0.015)	0.015 (0.013-0.017)	0.016 (0.014-0.019)
45-day	0.004 (0.004-0.004)	0.005 (0.005-0.005)	0.006 (0.006-0.006)	0.007 (0.006-0.007)	0.008 (0.007-0.009)	0.009 (0.008-0.009)	0.009 (0.009-0.010)	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.012 (0.010-0.013)
60-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.006)	0.007 (0.006-0.007)	0.007 (0.007-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.011)

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

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

Please refer to NOAA Atlas 14 document for more information.

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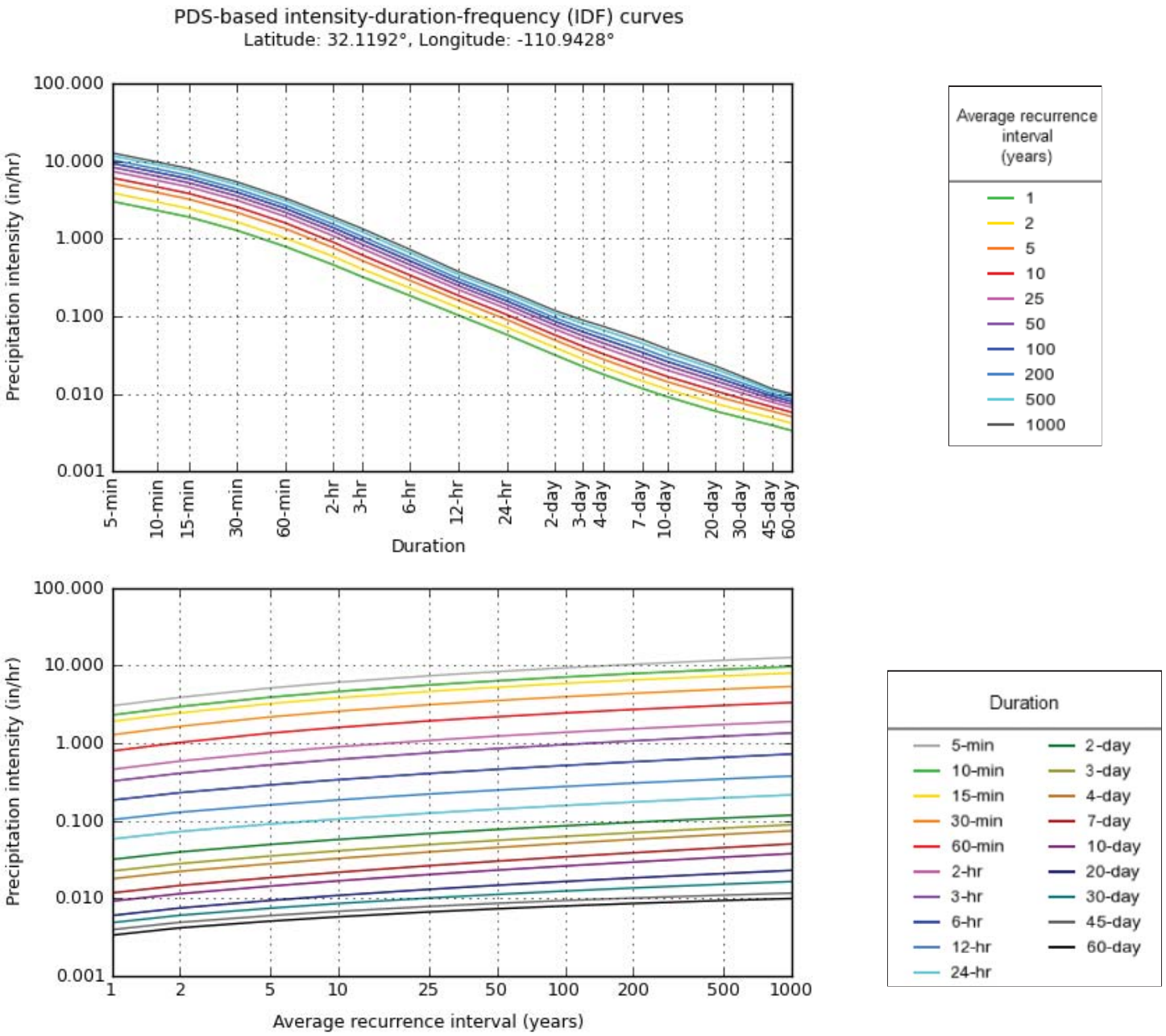
PF graphical



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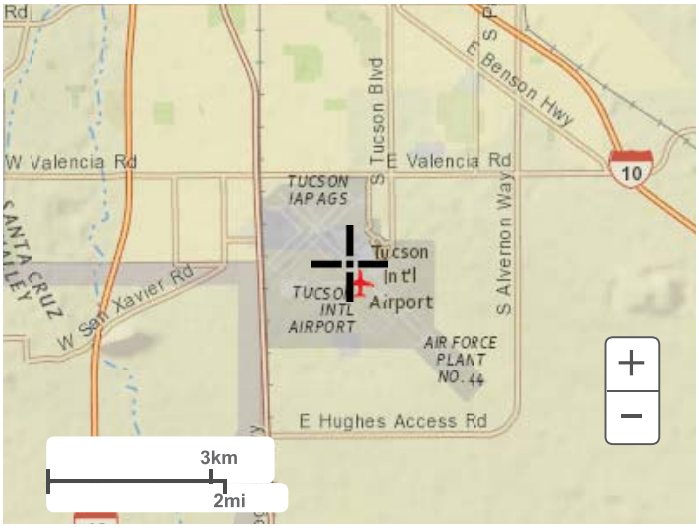

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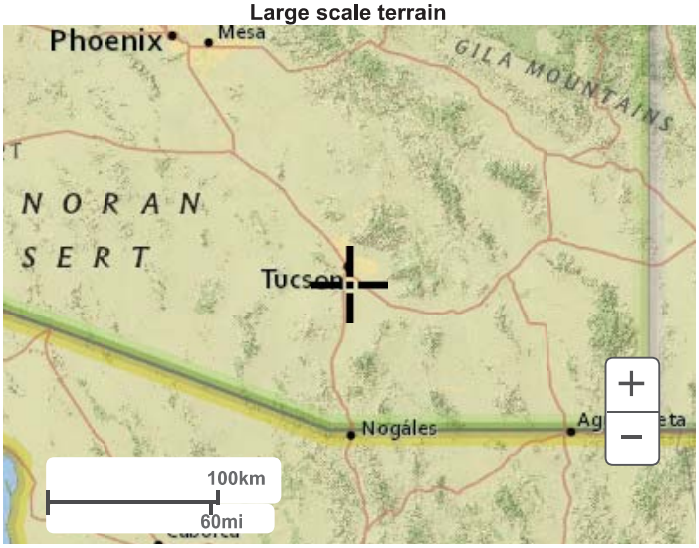

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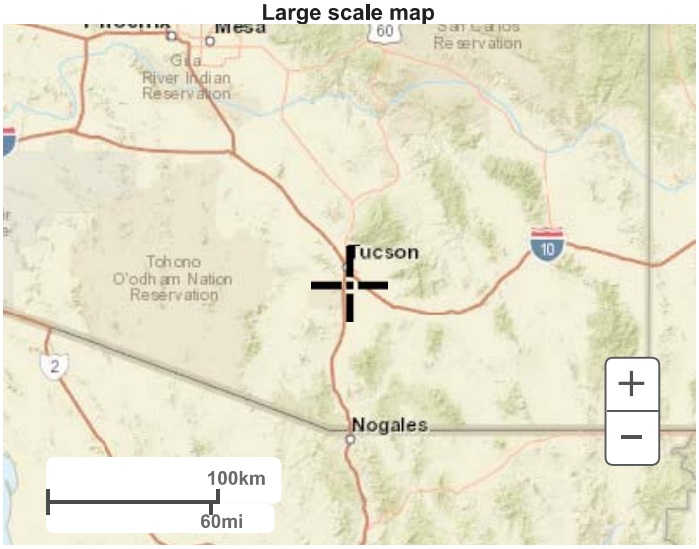

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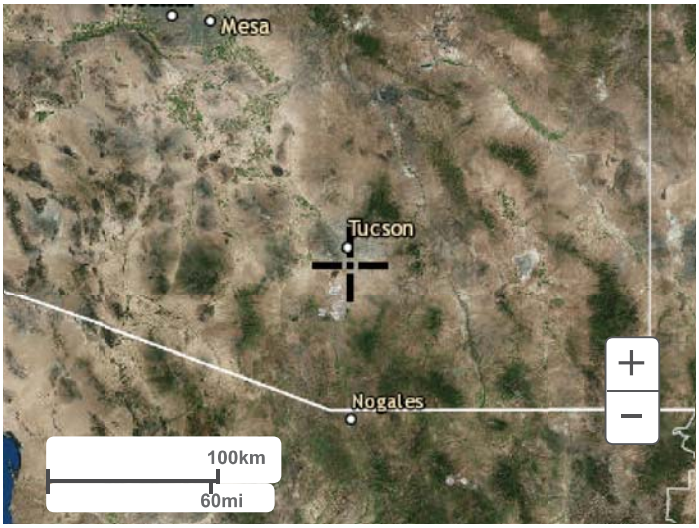

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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Appendix A.2 – Calculations

Project: Tucson International Airport
Subject: Summary
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017

Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

*Drainage Area ID	*Area Total (sf)	Area (acres)	Contributing Flow 5 - Year (cfs)	Contributing Flow 100 - Year (cfs)	Pervious Area/ Storage ID	*Area (sf)	Area (acres)
DA-01	1,234,628	28.3	18.9	53.9	SA-01	699,488	16.1
DA-02	312,909	7.2	8.7	24.7	SA-02	140,807	3.2
DA-03	430,629	9.9	10.8	30.8	SA-03	240,737	5.5
DA-04	289,581	6.6	7.4	21.2	SA-04	126,332	2.9
DA-05	145,683	3.3	4.2	12.1	SA-05	63,978	1.5
DA-06	352,978	8.1	9.0	25.7	SA-06	146,755	3.4
DA-07	355,831	8.2	9.1	26.1	SA-07	142,623	3.3
DA-08	309,682	7.1	8.5	24.2	SA-08	140,681	3.2
DA-09	300,598	6.9	8.5	24.2	SA-09	114,913	2.6
DA-10	302,198	6.9	8.4	23.9	SA-10	113,362	2.6
DA-11	717,615	16.5	13.6	38.8	SA-11	411,303	9.4
DA-12	1,780,985	40.9	31.9	91.1	SA-12	1,210,237	27.8
DA-13	801,867	18.4	15.4	43.9	SA-13	408,631	9.4
DA-14	802,726	18.4	15.7	44.8	SA-14	409,985	9.4
DA-15	611,475	14.0	12.5	35.7	SA-15	343,285	7.9
DA-16	391,502	9.0	8.4	24.1	SA-16	160,736	3.7
DA-17	1,008,430	23.2	17.2	49.2	SA-17	527,539	12.1
DA-18	739,420	17.0	12.3	35.2	SA-18	385,315	8.8
DA-19	644,703	14.8	12.8	36.5	SA-19	355,405	8.2
DA-20	672,693	15.4	14.7	41.9	SA-20	332,756	7.6
DA-21	542,386	12.5	11.5	33.0	SA-21	252,134	5.8
DA-22	777,165	17.8	14.4	41.1	SA-22	423,544	9.7
DA-23	428,416	9.8	8.3	23.7	SA-23	193,213	4.4
DA-24	610,310	14.0	10.9	31.1	SA-24	314,103	7.2
DA-25	534,241	12.3	10.6	30.4	SA-25	243,950	5.6
DA-26	365,559	8.4	9.3	26.5	SA-26	82,288	1.9
DA-27	302,592	6.9	7.6	21.7	SA-27	82,770	1.9
DA-28	430,460	9.9	12.0	34.2	SA-28	125,929	2.9
DA-29	948,833	21.8	18.4	52.5	SA-29	550,958	12.6
DA-30	276,453	6.3	6.9	19.8	SA-30	80,355	1.8
DA-31	1,124,933	25.8	21.5	61.4	SA-31	655,267	15.0
DA-32	1,119,211	25.7	21.5	61.6	SA-32	649,816	14.9
DA-33	1,036,665	23.8	21.5	61.3	SA-33	632,269	14.5
DA-34	1,318,983	30.3	24.0	68.5	SA-34	802,107	18.4
DA-35	506,488	11.6	12.9	36.7	SA-35	232,215	5.3
DA-36	256,513	5.9	7.8	22.2	SA-36	102,295	2.3
DA-37	313,944	7.2	7.5	21.5	SA-37	184,219	4.2
(PROP) AF-DA-1	1,820,116	41.8	27.4	78.4	N/A	N/A	N/A
(PROP) AF-DA-2	7,007,424	160.9	95.1	271.6	N/A	N/A	N/A
(PROP) AF-DA-3	3,368,198	77.3	40.2	115.0	N/A	N/A	N/A
(PROP) AF-DA-4	25,650,188	588.8	173.3	495.0	N/A	N/A	N/A
(PROP) AF-DA-5	27,142,971	623.1	135.6	387.3	N/A	N/A	N/A
(PROP) AF-DA-6	2,823,329	64.8	27.4	78.4	N/A	N/A	N/A
(EX) AF-DA-1	1,820,116	41.8	27.4	78.4	N/A	N/A	N/A
(EX) AF-DA-2	7,007,424	160.9	95.1	271.6	N/A	N/A	N/A
(EX) AF-DA-3	3,368,198	77.3	40.2	115.0	N/A	N/A	N/A
(EX) AF-DA-4	26,952,645	618.7	165.9	474.0	N/A	N/A	N/A
(EX) AF-DA-5	25,845,028	593.3	119.5	341.3	N/A	N/A	N/A
(EX) AF-DA-6	2,823,329	64.8	40.22582117	114.9309176	N/A	N/A	N/A

Notes:
1) * = User Input Required

Project: Tucson International Airport
Subject: Summary
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017

Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

DA Group - Discharge Pt.	Drainage Area ID	Area (acres)	Outlet Slope (ft/ft)	Discharge - 5 yr (cfs)	Pipe Size Required (in)
1	8	7.1	0.0073	7.8	18
	8,5	10.5	0.0062	9.7	24
	8,5,3	20.3	0.0058	15.3	24
	8,5,3,2	27.5	0.0060	18.7	24
	8,5,3,2,1*	55.9	0.0037	21.8	30
2	6	8.1	0.0047	8.1	18
	7	8.2	0.0070	8.8	18
	6,7,4*	22.9	0.0058	18.7	30
3	11	16.5	0.0071	13.5	24
	11,10	23.4	0.0066	17.1	24
	11,10,9	30.3	0.0061	19.7	24
	15	14.0	0.0061	11.8	24
	15,14	32.5	0.0064	20.7	24
	15,14,13	50.9	0.0068	31.1	30
	15,14,13,11,10,9,12*	122.1	0.0068	62.9	42
4	27	6.9	0.0082	6.2	18
	27,24	21.0	0.0058	12.1	24
	26	8.4	0.0117	8.2	18
	26,25	20.7	0.0085	14.6	24
	27,26,25,24,23	51.4	0.0061	27.1	30
	27,26,25,24,23,21	63.9	0.0064	29.1	30
	27,26,25,24,23,21,20	79.3	0.0065	34.3	30
	22	17.8	0.0068	14.2	24
	19	14.8	0.0058	12.0	24
	22,19,18	49.6	0.0061	27.2	30
	16	9.0	0.0049	0.2	24
	27,26,25,24,23,22,21,20,19,18,16,17*	161.1	0.0064	58.1	42

Project: Tucson International Airport
Subject: Onsite Calculations
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017

Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

															Table 4.1		Table 4.2		Table 4.3	Table 4.4				Table 4.5
Drainage Area ID	Area (acres)	*L_c (ft)	*ΔH (ft)	L_{ca} (feet)	*ΔL_1 (feet)	*ΔH_1 (feet)	*ΔL_2 (feet)	*ΔH_2 (feet)	*ΔL_3 (feet)	*ΔH_3 (feet)	*ΔL_4 (feet)	*ΔH_4 (feet)	G	S_c (ft/ft)	*$P_{1.100}$	*Watershed Type	*n_{b100}	*Soil Type	C_{w100}	*F_{ac}	T_{c100} (minutes)	i_{100} (in/hr)	Q_{p100} (cfs)	Q_{p5} (cfs)
DA-01	28.3	2064	8	1032	516	2	516	2	516	2	516	2	33152.75	0.0039	1.5	Comm./Ind.	0.048	D	0.83	1	32.5	2.3	53.9	18.9
DA-02	7.2	606	4	303	151.5	1	151.5	1	151.5	1	151.5	1	7458.971	0.0066	1.5	Comm./Ind.	0.048	D	0.86	1	9.8	4.0	24.7	8.7
DA-03	9.9	847	6	424	211.75	1.5	211.75	1.5	211.75	1.5	211.75	1.5	10063.51	0.0071	1.5	Comm./Ind.	0.048	D	0.83	1	12.1	3.7	30.8	10.8
DA-04	6.6	737	4	369	184.25	1	184.25	1	184.25	1	184.25	1	10003.94	0.0054	1.5	Comm./Ind.	0.048	D	0.86	1	12.2	3.7	21.2	7.4
DA-05	3.3	403	2	202	100.75	0.5	100.75	0.5	100.75	0.5	100.75	0.5	5720.613	0.0050	1.5	Comm./Ind.	0.048	D	0.86	1	8.5	4.2	12.1	4.2
DA-06	8.1	829	5	415	207.25	1.25	207.25	1.25	207.25	1.25	207.25	1.25	10674.48	0.0060	1.5	Comm./Ind.	0.048	D	0.86	1	12.6	3.7	25.7	9.0
DA-07	8.2	822	5	411	205.5	1.25	205.5	1.25	205.5	1.25	205.5	1.25	10539.57	0.0061	1.5	Comm./Ind.	0.048	D	0.87	1	12.5	3.7	26.1	9.1
DA-08	7.1	818	8	409	204.5	2	204.5	2	204.5	2	204.5	2	8271.513	0.0098	1.5	Comm./Ind.	0.048	D	0.85	1	10.1	4.0	24.2	8.5
DA-09	6.9	716	6	358	179	1.5	179	1.5	179	1.5	179	1.5	7821.569	0.0084	1.5	Comm./Ind.	0.048	D	0.87	1	9.8	4.0	24.2	8.5
DA-10	6.9	699	5	350	174.75	1.25	174.75	1.25	174.75	1.25	174.75	1.25	8264.77	0.0072	1.5	Comm./Ind.	0.048	D	0.87	1	10.3	4.0	23.9	8.4
DA-11	16.5	1946	14	973	486.5	3.5	486.5	3.5	486.5	3.5	486.5	3.5	22943	0.0072	1.5	Comm./Ind.	0.048	D	0.83	1	22.3	2.8	38.8	13.6
DA-12	40.9	2004	14	1002	501	3.5	501	3.5	501	3.5	501	3.5	23976.32	0.0070	1.5	Comm./Ind.	0.048	D	0.81	1	23.5	2.8	91.1	31.9
DA-13	18.4	1912	13	956	478	3.25	478	3.25	478	3.25	478	3.25	23187.83	0.0068	1.5	Comm./Ind.	0.048	D	0.84	1	22.4	2.8	43.9	15.4
DA-14	18.4	1911	14	956	477.75	3.5	477.75	3.5	477.75	3.5	477.75	3.5	22326.83	0.0073	1.5	Comm./Ind.	0.048	D	0.84	1	21.6	2.9	44.8	15.7
DA-15	14.0	1636	12	818	409	3	409	3	409	3	409	3	19102.24	0.0073	1.5	Comm./Ind.	0.048	D	0.83	1	19.3	3.1	35.7	12.5
DA-16	9.0	1225	6	613	306.25	1.5	306.25	1.5	306.25	1.5	306.25	1.5	17503.65	0.0049	1.5	Comm./Ind.	0.048	D	0.86	1	18.6	3.1	24.1	8.4
DA-17	23.2	2416	16	1208	604	4	604	4	604	4	604	4	29688.31	0.0066	1.5	Comm./Ind.	0.048	D	0.84	1	27.4	2.5	49.2	17.2
DA-18	17.0	2064	10	1032	516	2.5	516	2.5	516	2.5	516	2.5	29652.72	0.0048	1.5	Comm./Ind.	0.048	D	0.84	1	28.6	2.5	35.2	12.3
DA-19	14.8	1726	12	863	431.5	3	431.5	3	431.5	3	431.5	3	20700.01	0.0070	1.5	Comm./Ind.	0.048	D	0.83	1	20.6	3.0	36.5	12.8
DA-20	15.4	1619	14	810	404.75	3.5	404.75	3.5	404.75	3.5	404.75	3.5	17410.3	0.0086	1.5	Comm./Ind.	0.048	D	0.85	1	17.4	3.2	41.9	14.7
DA-21	12.5	1369	8	685	342.25	2	342.25	2	342.25	2	342.25	2	17908.54	0.0058	1.5	Comm./Ind.	0.048	D	0.85	1	18.6	3.1	33.0	11.5
DA-22	17.8	2032	14	1016	508	3.5	508	3.5	508	3.5	508	3.5	24480.57	0.0069	1.5	Comm./Ind.	0.048	D	0.84	1	23.5	2.8	41.1	14.4
DA-23	9.8	1315	5	658	328.75	1.25	328.75	1.25	328.75	1.25	328.75	1.25	21325.72	0.0038	1.5	Comm./Ind.	0.048	D	0.86	1	22.5	2.8	23.7	8.3
DA-24	14.0	1543	6	772	385.75	1.5	385.75	1.5	385.75	1.5	385.75	1.5	24744.19	0.0039	1.5	Comm./Ind.	0.048	D	0.84	1	25.4	2.6	31.1	10.9
DA-25	12.3	1358	6	679	339.5	1.5	339.5	1.5	339.5	1.5	339.5	1.5	20430.27	0.0044	1.5	Comm./Ind.	0.048	D	0.85	1	21.4	2.9	30.4	10.6
DA-26	8.4	1629	20	815	407.25	5	407.25	5	407.25	5	407.25	5	14701.67	0.0123	1.5	Comm./Ind.	0.048	D	0.90	1	14.3	3.5	26.5	9.3
DA-27	6.9	1626	20	813	406.5	5	406.5	5	406.5	5	406.5	5	14661.07	0.0123	1.5	Comm./Ind.	0.048	D	0.89	1	14.3	3.5	21.7	7.6
DA-28	9.9	786	6	393	196.5	1.5	196.5	1.5	196.5	1.5	196.5	1.5	8996.181	0.0076	1.5	Comm./Ind.	0.048	D	0.89	1	10.8	3.9	34.2	12.0
DA-29	21.8	1499	8	750	374.75	2	374.75	2	374.75	2	374.75	2	20519.06	0.0053	1.5	Comm./Ind.	0.048	D	0.83	1	21.3	2.9	52.5	18.4
DA-30	6.3	996	6	498	249	1.5	249	1.5	249	1.5	249	1.5	12832.56	0.0060	1.5	Comm./Ind.	0.048	D	0.89	1	14.2	3.5	19.8	6.9
DA-31	25.8	1798	12	899	449.5	3	449.5	3	449.5	3	449.5	3	22008.68	0.0067	1.5	Comm./Ind.	0.048	D	0.83	1	21.8	2.9	61.4	21.5
DA-32	25.7	1777	12	889	444.25	3	444.25	3	444.25	3	444.25	3	21624.22	0.0068	1.5	Comm./Ind.	0.048	D	0.83	1	21.5	2.9	61.6	21.5
DA-33	23.8	1613	13	807	403.25	3.25	403.25	3.25	403.25	3.25	403.25	3.25	17967.18	0.0081	1.5	Comm./Ind.	0.048	D	0.82	1	18.3	3.1	61.3	21.5
DA-34	30.3	2083	15	1042	520.75	3.75	520.75	3.75	520.75	3.75	520.75	3.75	24546.43	0.0072	1.5	Comm./Ind.	0.048	D	0.82	1	23.6	2.8	68.5	24.0
DA-35	11.6	745	4	373	186.25	1	186.25	1	186.25	1	186.25	1	10167.27	0.0054	1.5	Comm./Ind.	0.048	D	0.85	1	12.4	3.7	36.7	12.9
DA-36	5.9	477	4	239	119.25	1	119.25	1	119.25	1	119.25	1	5208.919	0.0084	1.5	Comm./Ind.	0.048	D	0.87	1	7.6	4.3	22.2	7.8
DA-37	7.2	695	3	348	173.75	0.75	173.75	0.75	173.75	0.75	173.75	0.75	10578.32	0.0043	1.5	Comm./Ind.	0.048	D	0.83	1	13.3	3.6	21.5	7.5
(PROP) AF-DA-1	41.8	2236	16	1118	559	4	559	4	559	4	559	4	26433.08	0.0072	1.5	Comm./Ind.	0.048	D	0.73	1	26.7	2.6	78.4	27.4
(PROP) AF-DA-2	160.9	4027	28	2014	1006.75	7	1006.75	7	1006.75	7	1006.75	7	48294.03	0.0070	1.5	Comm./Ind.	0.048	D	0.85	1	40.4	2.0	271.6	95.1
(PROP) AF-DA-3	77.3	3962	24	1981	990.5	6	990.5	6	990.5	6	990.5	6	50905.66	0.0061	1.5	Comm./Ind.	0.048	D	0.80	1	44.6	1.9	115.0	40.2
(PROP) AF-DA-4	588.8	9456	52	4728	2364	13	2364	13	2364	13	2364	13	127514.5	0.0055	1.5	Comm./Ind.	0.048	D	0.83	1	98.5	1.0	495.0	173.3
(PROP) AF-DA-5	623.1	15701	110	7850.5	3925.25	27.5	3925.25	27.5	3925.25	27.5	3925.25	27.5	187583.5	0.0070	1.5	Comm./Ind.	0.048	D	0.81	1	136.4	0.8	387.3	135.6
(PROP) AF-DA-6	64.8	3528	22	1764	882	5.5	882	5.5	882	5.5	882	5.5	44676.74	0.0062	1.5	Comm./Ind.	0.048	D	0.86	1	38.2	2.1	114.9	40.2
(EX) AF-DA-1	41.8	2236	16	1118	559	4	559	4	559	4	559	4	26433.08	0.0072	1.5	Comm./Ind.	0.048	D	0.73	1	26.7	2.6	78.4	27.4
(EX) AF-DA-2	160.9	4027	28	2014	1006.75	7	1006.75	7	1006.75	7	1006.75	7	48294.03	0.0070	1.5	Comm./Ind.	0.048	D	0.85	1	40.4	2.0	271.6	95.1
(EX) AF-DA-3	77.3	3962	24	1981	990.5	6	990.5	6	990.5	6	990.5	6	50905.66	0.0061	1.5	Comm./Ind.	0.048	D	0.80	1	44.6	1.9	115.0	40.2
(EX) AF-DA-4	618.7	9456	52	4728	2364	13	2364	13	2364	13	2364	13	127514.5	0.0055	1.5	Comm./Ind.	0.048	D	0.78	1	102.2	1.0	474.0	165.9
(EX) AF-DA-5	593.3	15701	110	7850.5	3925.25	27.5	3925.25	27.5	3925.25	27.5	3925.25	27.5	187583.5	0.0070	1.5	Comm./Ind.	0.048	D	0.77	1	140.6	0.7	341.3	119.5
(EX) AF-DA-6	64.8	3528	22	1764	882	5.5	882	5.5	882	5.5	882	5.5	44676.74	0.0062	1.5	Comm./Ind.	0.048	D	0.86	1	38.2	2.1	114.9	40.2

Notes:
1) * = User Input Required

Project: Tucson International Airport
Subject: Weighted C-Values
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017
Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff)

Drainage Area ID	*Surface 1 Coeff. Asphalt/Concrete	*Surface 1 Area (sf)	*Surface 2 Coeff. Natural Ground	*Surface 2 Area (sf)	Weighted C-Value
DA-01	0.95	535,140	0.74	699,488	0.83
DA-02	0.95	172,102	0.74	140,807	0.86
DA-03	0.95	189,892	0.74	240,737	0.83
DA-04	0.95	163,249	0.74	126,332	0.86
DA-05	0.95	81,705	0.74	63,978	0.86
DA-06	0.95	206,223	0.74	146,755	0.86
DA-07	0.95	213,208	0.74	142,623	0.87
DA-08	0.95	169,001	0.74	140,681	0.85
DA-09	0.95	185,685	0.74	114,913	0.87
DA-10	0.95	188,836	0.74	113,362	0.87
DA-11	0.95	306,312	0.74	411,303	0.83
DA-12	0.95	570,748	0.74	1,210,237	0.81
DA-13	0.95	393,236	0.74	408,631	0.84
DA-14	0.95	392,741	0.74	409,985	0.84
DA-15	0.95	268,190	0.74	343,285	0.83
DA-16	0.95	230,766	0.74	160,736	0.86
DA-17	0.95	480,891	0.74	527,539	0.84
DA-18	0.95	354,105	0.74	385,315	0.84
DA-19	0.95	289,298	0.74	355,405	0.83
DA-20	0.95	339,937	0.74	332,756	0.85
DA-21	0.95	290,252	0.74	252,134	0.85
DA-22	0.95	353,621	0.74	423,544	0.84
DA-23	0.95	235,203	0.74	193,213	0.86
DA-24	0.95	296,207	0.74	314,103	0.84
DA-25	0.95	290,291	0.74	243,950	0.85
DA-26	0.95	283,271	0.74	82,288	0.90
DA-27	0.95	219,822	0.74	82,770	0.89
DA-28	0.95	304,531	0.74	125,929	0.89
DA-29	0.95	397,875	0.74	550,958	0.83
DA-30	0.95	196,098	0.74	80,355	0.89
DA-31	0.95	469,666	0.74	655,267	0.83
DA-32	0.95	469,395	0.74	649,816	0.83
DA-33	0.95	404,396	0.74	632,269	0.82
DA-34	0.95	516,876	0.74	802,107	0.82
DA-35	0.95	274,273	0.74	232,215	0.85
DA-36	0.95	154,218	0.74	102,295	0.87
DA-37	0.95	129,725	0.74	184,219	0.83

Notes:
1) * = User Input Required
2) Airfield C-Values were calculated in another spreadsheet, also found in the appendix.

Project: Tucson International Airport
Subject: Ratio Factors from Table 4.5
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017
Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

Drainage Area ID	*Factor from Table **4.5**
DA-01	0.35
DA-02	0.35
DA-03	0.35
DA-04	0.35
DA-05	0.35
DA-06	0.35
DA-07	0.35
DA-08	0.35
DA-09	0.35
DA-10	0.35
DA-11	0.35
DA-12	0.35
DA-13	0.35
DA-14	0.35
DA-15	0.35
DA-16	0.35
DA-17	0.35
DA-18	0.35
DA-19	0.35
DA-20	0.35
DA-21	0.35
DA-22	0.35
DA-23	0.35
DA-24	0.35
DA-25	0.35
DA-26	0.35
DA-27	0.35
DA-28	0.35
DA-29	0.35
DA-30	0.35
DA-31	0.35
DA-32	0.35
DA-33	0.35
DA-34	0.35
DA-35	0.35
DA-36	0.35
DA-37	0.35
(PROP) AF-DA-1	0.35
(PROP) AF-DA-2	0.35
(PROP) AF-DA-3	0.35
(PROP) AF-DA-4	0.35
(PROP) AF-DA-5	0.35
(PROP) AF-DA-6	0.35
(EX) AF-DA-1	0.35
(EX) AF-DA-2	0.35
(EX) AF-DA-3	0.35
(EX) AF-DA-4	0.35
(EX) AF-DA-5	0.35
(EX) AF-DA-6	0.35

Project: Tucson International Airport
Subject: Pipe Sizing
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017
Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

Project: Tucson International Airport
Subject: Ratio Factors from Table 4.5
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017
Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

																Table 4.1		Table 4.2		Table 4.3	Table 4.4				Table 4.5		
DA Group - Discharge Pt.	Drainage Area ID	Area (acres)	*L_c (ft)	*ΔH (ft)	L_{ca} (feet)	*ΔL_1 (feet)	*ΔH_1 (feet)	*ΔL_2 (feet)	*ΔH_2 (feet)	*ΔL_3 (feet)	*ΔH_3 (feet)	*ΔL_4 (feet)	*ΔH_4 (feet)	G	S_c (ft/ft)	*$P_{1.100}$	*Watershed Type	*n_{b100}	*Soil Type	C_{w100}	*F_{ac}	T_{c100} (minutes)	i_{100} (in/hr)	Q_{p100} (cfs)	Q_{p5} (cfs)	Pipe Size Needed (Inches)
	8	7.1	821	6	410.5	205.25	1.5	205.25	1.5	205.25	1.5	205.25	1.5	9603.7	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	11.7	3.8	22.3	7.8	18
	8,5	10.5	1286	8	643	321.5	2	321.5	2	321.5	2	321.5	2	16304.8	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	17.5	3.2	27.8	9.7	24
1	8,5,3	20.3	2073	12	1036.5	518.25	3	518.25	3	518.25	3	518.25	3	27246.3	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	26.3	2.6	43.8	15.3	24
	8,5,3,2	27.5	2654	16	1327	663.5	4	663.5	4	663.5	4	663.5	4	34181.5	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	31.4	2.3	53.4	18.7	24
	8,5,3,2,1*	55.9	4880	18	2440	1220	4.5	1220	4.5	1220	4.5	1220	4.5	80351.4	0.004	1.5	Comm./Ind.	0.048	D	0.83	1	69.4	1.3	62.2	21.8	30
	6	8.1	856	4	428	214	1	214	1	214	1	214	1	12522.2	0.005	1.5	Comm./Ind.	0.048	D	0.83	1	14.9	3.4	23.1	8.1	18
2	7	8.2	863	6	431.5	215.75	1.5	215.75	1.5	215.75	1.5	215.75	1.5	10350.0	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	12.4	3.7	25.1	8.8	18
	6,7,4*	22.9	1728	10	864	432	2.5	432	2.5	432	2.5	432	2.5	22715.1	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	22.7	2.8	53.4	18.7	30
	11	16.5	1959	14	979.5	489.75	3.5	489.75	3.5	489.75	3.5	489.75	3.5	23173.3	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	22.5	2.8	38.6	13.5	24
	11,10	23.4	2416	16	1208	604	4	604	4	604	4	604	4	29688.3	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	27.6	2.5	49.0	17.1	24
	11,10,9	30.3	2933	18	1466.5	733.25	4.5	733.25	4.5	733.25	4.5	733.25	4.5	37439.7	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	33.7	2.2	56.2	19.7	24
3	15	14.0	1646	10	823	411.5	2.5	411.5	2.5	411.5	2.5	411.5	2.5	21117.6	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	21.3	2.9	33.8	11.8	24
	15,14	32.5	3124	20	1562	781	5	781	5	781	5	781	5	39043.8	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	34.7	2.2	59.1	20.7	24
	15,14,13	50.9	3525	24	1762.5	881.25	6	881.25	6	881.25	6	881.25	6	42720.2	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	37.1	2.1	88.8	31.1	30
	15,14,13,11,10,9,12*	122.1	4731	32	2365.5	1182.75	8	1182.75	8	1182.75	8	1182.75	8	57524.7	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	47.7	1.8	179.7	62.9	42
	27	6.9	1713	14	856.5	428.25	3.5	428.25	3.5	428.25	3.5	428.25	3.5	18948.4	0.008	1.5	Comm./Ind.	0.048	D	0.83	1	18.9	3.1	17.8	6.2	18
	27,24	21.0	3472	20	1736	868	5	868	5	868	5	868	5	45746.2	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	40.2	2.0	34.7	12.1	24
	26	8.4	1709	20	854.5	427.25	5	427.25	5	427.25	5	427.25	5	15797.9	0.012	1.5	Comm./Ind.	0.048	D	0.83	1	15.8	3.4	23.4	8.2	18
	26,25	20.7	3054	26	1527	763.5	6.5	763.5	6.5	763.5	6.5	763.5	6.5	33099.2	0.009	1.5	Comm./Ind.	0.048	D	0.83	1	29.2	2.4	41.8	14.6	24
	27,26,25,24,23	51.4	4252	26	2126	1063	6.5	1063	6.5	1063	6.5	1063	6.5	54375.5	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	46.1	1.8	77.5	27.1	30
4	27,26,25,24,23,21	63.9	5596	36	2798	1399	9	1399	9	1399	9	1399	9	69769.5	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	56.7	1.6	83.0	29.1	30
	27,26,25,24,23,21,20	79.3	6117	40	3058.5	1529.25	10	1529.25	10	1529.25	10	1529.25	10	75644.6	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	60.6	1.5	98.0	34.3	30
	22	17.8	2045	14	1022.5	511.25	3.5	511.25	3.5	511.25	3.5	511.25	3.5	24715.9	0.007	1.5	Comm./Ind.	0.048	D	0.83	1	23.8	2.7	40.6	14.2	24
	19	14.8	1737	10	868.5	434.25	2.5	434.25	2.5	434.25	2.5	434.25	2.5	22892.8	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	22.9	2.8	34.4	12.0	24
	22,19,18	49.6	3951	24	1975.5	987.75	6	987.75	6	987.75	6	987.75	6	50693.8	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	43.5	1.9	77.8	27.2	30
	16	9.0	1225	6	612.5	306.25	1.5	306.25	1.5	306.25	1.5	306.25	1.5	17503.6	0.005	1.5	Comm./Ind.	1.048	D	0.83	1	1895.5	0.1	0.5	0.2	24
	27,26,25,24,23,22,21,20,19,18,16,17[1]	161.1	7855	50	3927.5	1963.75	12.5	1963.75	12.5	1963.75	12.5	1963.75	12.5	98454.2	0.006	1.5	Comm./Ind.	0.048	D	0.83	1	76.6	1.2	166.1	58.1	42

Notes:

1) * = Discharge Point

Project: Tucson International Airport
Subject: Hydrograph Calculations
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017

Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

Drainage Area ID	Area (acres)	Tc100 (minutes)	i100 (in/hr)	Qp100 (cfs)	Qp5 (cfs)
(PROP) AF-DA-1	41.8	26.7	2.6	78.4	27.4
(PROP) AF-DA-2	160.9	40.4	2.0	271.6	95.1
(PROP) AF-DA-3	77.3	44.6	1.9	115.0	40.2
(PROP) AF-DA-4	588.8	98.5	1.0	495.0	173.3
(PROP) AF-DA-5	623.1	136.4	0.8	387.3	135.6
(PROP) AF-DA-6	64.8	38.2	2.1	114.9	40.2
(EX) AF-DA-1	41.8	26.7	2.6	78.4	27.4
(EX) AF-DA-2	160.9	40.4	2.0	271.6	95.1
(EX) AF-DA-3	77.3	44.6	1.9	115.0	40.2
(EX) AF-DA-4	618.7	102.2	1.0	474.0	165.9
(EX) AF-DA-5	593.3	140.6	0.7	341.3	119.5
(EX) AF-DA-6	64.8	38.2	2.1	114.9	40.2

(EX) AF-DA-4 (5-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	7.3	0.025	4.1
0.2	14.5	0.087	14.4
0.3	21.8	0.16	26.5
0.4	29.1	0.243	40.3
0.5	36.4	0.346	57.4
0.6	43.6	0.451	74.8
0.7	50.9	0.576	95.6
0.8	58.2	0.738	122.4
0.9	65.4	0.887	147.2
1	**72.7**	1.000	**165.9**
1.1	80.0	0.924	153.3
1.2	87.2	0.839	139.2
1.3	94.5	0.756	125.4
1.4	101.8	0.678	112.5
1.5	109.1	0.604	100.2
1.6	116.3	0.545	90.4
1.7	123.6	0.482	80.0
1.8	130.9	0.424	70.3
1.9	138.1	0.372	61.7
2	145.4	0.323	53.6
2.2	159.9	0.241	40.0
2.4	174.5	0.179	29.7
2.6	189.0	0.136	22.6
2.8	203.6	0.102	16.9
3	218.1	0.078	12.9
3.4	247.2	0.049	8.1
3.8	276.3	0.03	5.0
4.2	305.3	0.02	3.3
4.6	334.4	0.012	2.0
5	363.5	0.008	1.3
7	508.9	0	0.0

(EX) AF-DA-5 (5-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	10.7	0.025	3.0
0.2	21.4	0.087	10.4
0.3	32.1	0.16	19.1
0.4	42.8	0.243	29.0
0.5	53.6	0.346	41.3
0.6	64.3	0.451	53.9
0.7	75.0	0.576	68.8
0.8	85.7	0.738	88.2
0.9	96.4	0.887	106.0
1	**107.1**	1.000	**119.5**
1.1	117.8	0.924	110.4
1.2	128.5	0.839	100.3
1.3	139.2	0.756	90.3
1.4	149.9	0.678	81.0
1.5	160.7	0.604	72.2
1.6	171.4	0.545	65.1
1.7	182.1	0.482	57.6
1.8	192.8	0.424	50.7
1.9	203.5	0.372	44.5
2	214.2	0.323	38.6
2.2	235.6	0.241	28.8
2.4	257.0	0.179	21.4
2.6	278.5	0.136	16.3
2.8	299.9	0.102	12.2
3	321.3	0.078	9.3
3.4	364.1	0.049	5.9
3.8	407.0	0.03	3.6
4.2	449.8	0.02	2.4
4.6	492.7	0.012	1.4
5	535.5	0.008	1.0
7	749.7	0	0.0

(EX) AF-DA-4 (100-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	7.3	0.025	11.9
0.2	14.5	0.087	41.2
0.3	21.8	0.16	75.8
0.4	29.1	0.243	115.2
0.5	36.4	0.346	164.0
0.6	43.6	0.451	213.8
0.7	50.9	0.576	273.0
0.8	58.2	0.738	349.8
0.9	65.4	0.887	420.4
1	**72.7**	1.000	**474.0**
1.1	80.0	0.924	438.0
1.2	87.2	0.839	397.7
1.3	94.5	0.756	358.3
1.4	101.8	0.678	321.4
1.5	109.1	0.604	286.3
1.6	116.3	0.545	258.3
1.7	123.6	0.482	228.5
1.8	130.9	0.424	201.0
1.9	138.1	0.372	176.3
2	145.4	0.323	153.1
2.2	159.9	0.241	114.2
2.4	174.5	0.179	84.8
2.6	189.0	0.136	64.5
2.8	203.6	0.102	48.3
3	218.1	0.078	37.0
3.4	247.2	0.049	23.2
3.8	276.3	0.03	14.2
4.2	305.3	0.02	9.5
4.6	334.4	0.012	5.7
5	363.5	0.008	3.8
7	508.9	0	0.0

(EX) AF-DA-5 (100-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	10.7	0.025	8.5
0.2	21.4	0.087	29.7
0.3	32.1	0.16	54.6
0.4	42.8	0.243	82.9
0.5	53.6	0.346	118.1
0.6	64.3	0.451	153.9
0.7	75.0	0.576	196.6
0.8	85.7	0.738	251.9
0.9	96.4	0.887	302.7
1	**107.1**	1.000	**341.3**
1.1	117.8	0.924	315.4
1.2	128.5	0.839	286.4
1.3	139.2	0.756	258.0
1.4	149.9	0.678	231.4
1.5	160.7	0.604	206.1
1.6	171.4	0.545	186.0
1.7	182.1	0.482	164.5
1.8	192.8	0.424	144.7
1.9	203.5	0.372	127.0
2	214.2	0.323	110.2
2.2	235.6	0.241	82.3
2.4	257.0	0.179	61.1
2.6	278.5	0.136	46.4
2.8	299.9	0.102	34.8
3	321.3	0.078	26.6
3.4	364.1	0.049	16.7
3.8	407.0	0.03	10.2
4.2	449.8	0.02	6.8
4.6	492.7	0.012	4.1
5	535.5	0.008	2.7
7	749.7	0	0.0

(PROP) AF-DA-4 (5-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	7.0	0.025	4.3
0.2	14.0	0.087	15.1
0.3	21.1	0.16	27.7
0.4	28.1	0.243	42.1
0.5	35.1	0.346	60.0
0.6	42.1	0.451	78.2
0.7	49.1	0.576	99.8
0.8	56.2	0.738	127.9
0.9	63.2	0.887	153.7
1	**70.2**	1.000	**173.3**
1.1	77.2	0.924	160.1
1.2	84.2	0.839	145.4
1.3	91.3	0.756	131.0
1.4	98.3	0.678	117.5
1.5	105.3	0.604	104.7
1.6	112.3	0.545	94.4
1.7	119.3	0.482	83.5
1.8	126.4	0.424	73.5
1.9	133.4	0.372	64.5
2	140.4	0.323	56.0
2.2	154.4	0.241	41.8
2.4	168.5	0.179	31.0
2.6	182.5	0.136	23.6
2.8	196.6	0.102	17.7
3	210.6	0.078	13.5
3.4	238.7	0.049	8.5
3.8	266.8	0.03	5.2
4.2	294.8	0.02	3.5
4.6	322.9	0.012	2.1
5	351.0	0.008	1.4
7	491.4	0	0.0

(PROP) AF-DA-5 (5-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	10.5	0.025	3.4
0.2	20.9	0.087	11.8
0.3	31.4	0.16	21.7
0.4	41.8	0.243	33.0
0.5	52.3	0.346	46.9
0.6	62.8	0.451	61.2
0.7	73.2	0.576	78.1
0.8	83.7	0.738	100.1
0.9	94.1	0.887	120.3
1	**104.6**	1.000	**135.6**
1.1	115.1	0.924	125.3
1.2	125.5	0.839	113.8
1.3	136.0	0.756	102.5
1.4	146.4	0.678	91.9
1.5	156.9	0.604	81.9
1.6	167.4	0.545	73.9
1.7	177.8	0.482	65.4
1.8	188.3	0.424	57.5
1.9	198.7	0.372	50.4
2	209.2	0.323	43.8
2.2	230.1	0.241	32.7
2.4	251.0	0.179	24.3
2.6	272.0	0.136	18.4
2.8	292.9	0.102	13.8
3	313.8	0.078	10.6
3.4	355.6	0.049	6.6
3.8	397.5	0.03	4.1
4.2	439.3	0.02	2.7
4.6	481.2	0.012	1.6
5	523.0	0.008	1.1
7	732.2	0	0.0

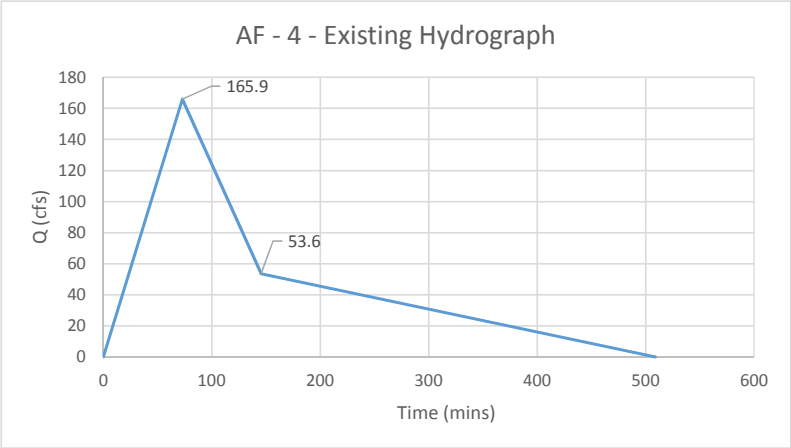
(PROP) AF-DA-4 (100-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	7.0	0.025	12.4
0.2	14.0	0.087	43.1
0.3	21.1	0.16	79.2
0.4	28.1	0.243	120.3
0.5	35.1	0.346	171.3
0.6	42.1	0.451	223.2
0.7	49.1	0.576	285.1
0.8	56.2	0.738	365.3
0.9	63.2	0.887	439.1
1	**70.2**	1.000	**495.0**
1.1	77.2	0.924	457.4
1.2	84.2	0.839	415.3
1.3	91.3	0.756	374.2
1.4	98.3	0.678	335.6
1.5	105.3	0.604	299.0
1.6	112.3	0.545	269.8
1.7	119.3	0.482	238.6
1.8	126.4	0.424	209.9
1.9	133.4	0.372	184.1
2	140.4	0.323	159.9
2.2	154.4	0.241	119.3
2.4	168.5	0.179	88.6
2.6	182.5	0.136	67.3
2.8	196.6	0.102	50.5
3	210.6	0.078	38.6
3.4	238.7	0.049	24.3
3.8	266.8	0.03	14.9
4.2	294.8	0.02	9.9
4.6	322.9	0.012	5.9
5	351.0	0.008	4.0
7	491.4	0	0.0

(PROP) AF-DA-5 (100-yr)			
t factor	t (Tr) minutes	Q factor	Q cfs
0	0.0	0	0.0
0.1	10.5	0.025	9.7
0.2	20.9	0.087	33.7
0.3	31.4	0.16	62.0
0.4	41.8	0.243	94.1
0.5	52.3	0.346	134.0
0.6	62.8	0.451	174.7
0.7	73.2	0.576	223.1
0.8	83.7	0.738	285.8
0.9	94.1	0.887	343.5
1	**104.6**	1.000	**387.3**
1.1	115.1	0.924	357.9
1.2	125.5	0.839	324.9
1.3	136.0	0.756	292.8
1.4	146.4	0.678	262.6
1.5	156.9	0.604	233.9
1.6	167.4	0.545	211.1
1.7	177.8	0.482	186.7
1.8	188.3	0.424	164.2
1.9	198.7	0.372	144.1
2	209.2	0.323	125.1
2.2	230.1	0.241	93.3
2.4	251.0	0.179	69.3
2.6	272.0	0.136	52.7
2.8	292.9	0.102	39.5
3	313.8	0.078	30.2
3.4	355.6	0.049	19.0
3.8	397.5	0.03	11.6
4.2	439.3	0.02	7.7
4.6	481.2	0.012	4.6
5	523.0	0.008	3.1
7	732.2	0	0.0

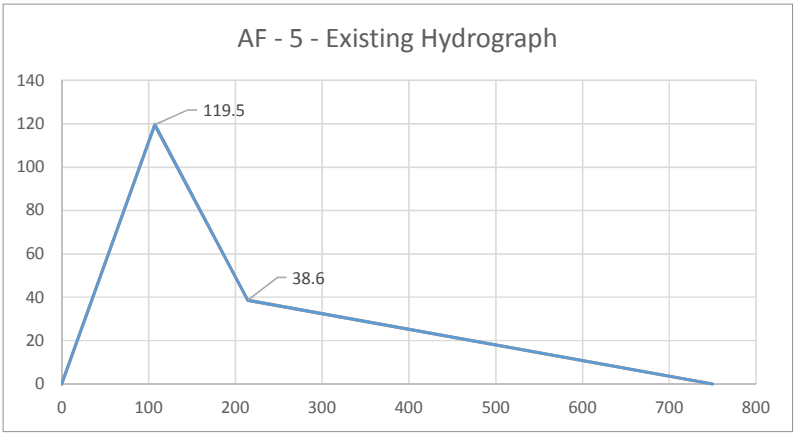
Project: Tucson International Airport
Subject: Hydrograph Calculations
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017
Reference: Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).

Existing 5-Year

DA - 4	
Time (mins)	Q (cfs)
0	0
72.7	165.9
145.4	53.6
508.9	0

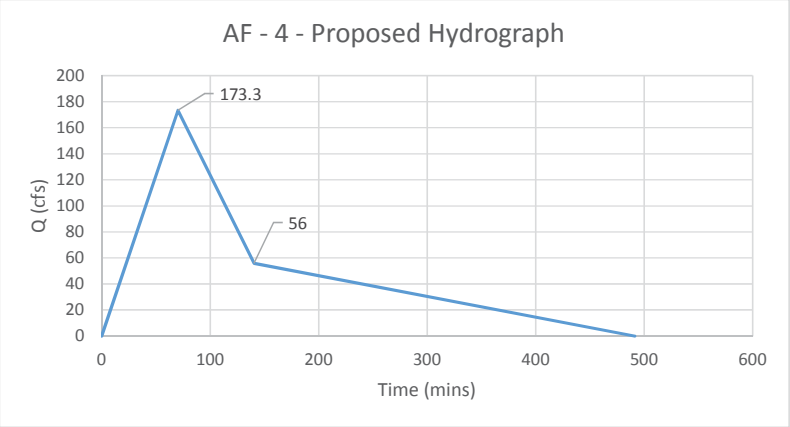


DA - 5	
Time (mins)	Q (cfs)
0	0
107.1	119.5
214.2	38.6
749.7	0

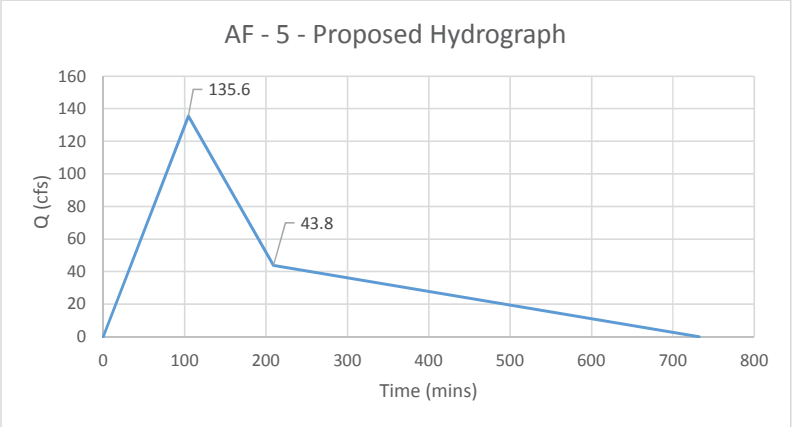


Proposed 5-Year

DA - 4	
Time (mins)	Q (cfs)
0	0
70.2	173.3
140.4	56
491.4	0

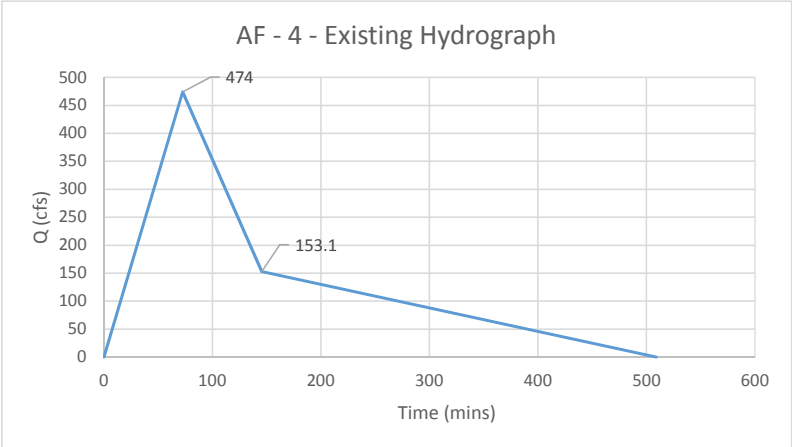


DA - 5	
Time (mins)	Q (cfs)
0	0
104.6	135.6
209.2	43.8
732.2	0

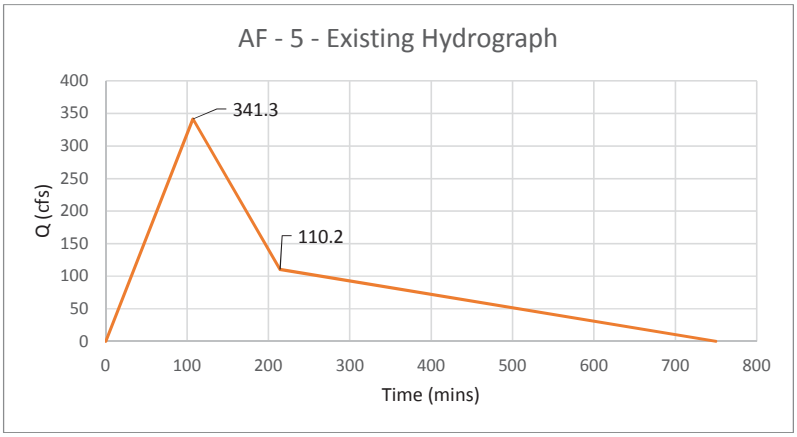


Existing 100-Year

DA - 4	
Time (mins)	Q (cfs)
0	0
72.7	474
145.4	153.1
508.9	0

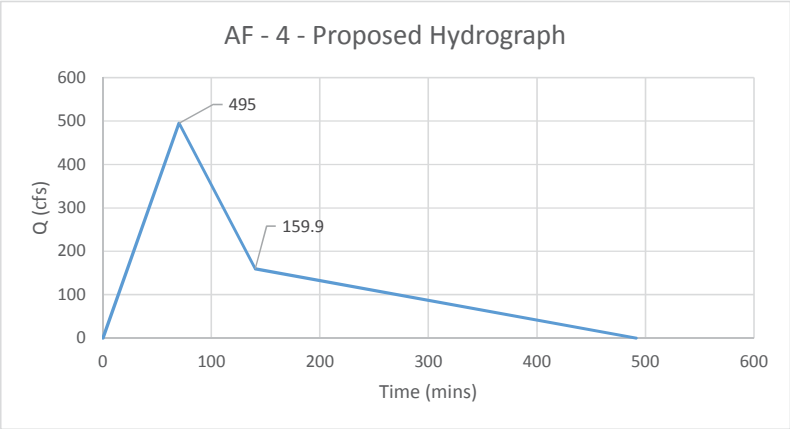


DA - 5	
Time (mins)	Q (cfs)
0	0
107.1	341.3
214.2	110.2
749.7	0

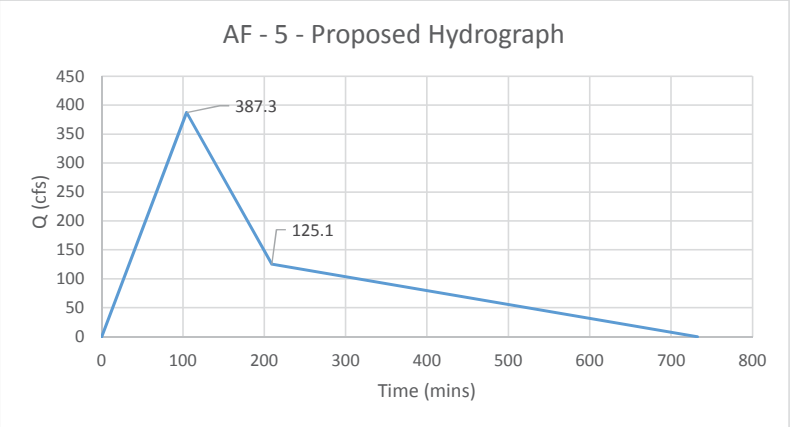


Proposed 100-Year

DA - 4	
Time (mins)	Q (cfs)
0	0
70.2	495
140.4	159.9
491.4	0



DA - 5	
Time (mins)	Q (cfs)
0	0
104.6	387.3
209.2	125.1
732.2	0



Project: Tucson International Airport
Subject: Soils Summary
Author: CGC
Location: Tucson, Arizona
Date: 11/21/2017
Reference: **Standards Manual for Drainage Design and Floodplain Management In Tucson, Arizona; July 1998 (eff).**

MUSYM	SCS Designation (B,C,D)
11	D
34	C
72	C
78	A (B used)
86	C
ClC	D
LeB	B
LrB	B
MhB	C
ReC	B

Appendix A.3 – Airfield C-Values Calculations

DA	Cw	Total Area (acres)
Existing		
1	0.7	41.8
2	0.85	160.9
3	0.79	77.3
4	0.8	618.7
5	0.79	593.3
6	0.86	64.8
Proposed		
1	0.73	41.8
2	0.85	160.9
3	0.8	77.3
4	0.83	588.8
5	0.81	623.1
6	0.86	64.8

DA	Area (sf)	Area (acres)
Existing		
1	1,820,116	41.8
2	7,007,424	160.9
3	3,368,198	77.3
4	26,952,645	618.7
5	25,845,028	593.3
6	2,823,329	64.8
Proposed		
1	1,820,116	41.8
2	7,007,424	160.9
3	3,368,198	77.3
4	25,650,188	588.8
5	27,142,971	623.1
6	2,823,329	64.8

DA - Existing	MUSYM	LU_Type	Pervious Area (acres)	SCS Designation	C	Total Pervious Area (acres)	Total Impervious Area (acres)	C*A Pervious	Cw Pervious	Cw Impervious	Weighted C-Value
	11	15	0.004	D	0.72			0.0			
	11	15	0.143	D	0.72			0.1			
	11	15	0.332	D	0.72			0.2			
	11	15	0.503	D	0.72			0.4			
	11	15	0.656	D	0.72			0.5			
	11	15	2.337	D	0.72			1.7			
	11	15	2.964	D	0.72			2.1			
1	11	5	0.004	D	0.69	32.6	9.2	0.0	0.67	0.95	**0.73**
	11	5	11.429	D	0.69			7.9			
	72	15	0.558	C	0.64			0.4			
	72	15	0.766	C	0.64			0.5			
	72	15	1.137	C	0.64			0.7			
	72	15	1.660	C	0.64			1.1			
	72	5	7.918	C	0.61			4.8			
	86	15	0.473	C	0.64			0.3			
	86	5	1.696	C	0.61			1.0			
	11	15	0.020	D	0.72			0.0			
	11	15	0.020	D	0.72			0.0			
	11	15	1.127	D	0.72			0.8			
	11	15	1.210	D	0.72			0.9			
	11	15	1.236	D	0.72			0.9			
	11	15	1.290	D	0.72			0.9			
	11	15	12.409	D	0.72			8.9			
	11	5	3.848	D	0.69			2.7			
	72	15	0.308	C	0.64			0.2			
	72	15	0.618	C	0.64			0.4			
	72	15	0.785	C	0.64			0.5			
	72	15	1.052	C	0.64			0.7			
2	72	15	1.715	C	0.64	54.5	106.4	1.1	0.66	0.95	**0.85**
	72	15	1.892	C	0.64			1.2			
	72	15	2.186	C	0.64			1.4			
	72	15	2.403	C	0.64			1.5			
	72	15	2.896	C	0.64			1.9			
	72	15	6.625	C	0.64			4.2			
	72	5	0.072	C	0.61			0.0			
	72	5	0.196	C	0.61			0.1			
	72	5	2.160	C	0.61			1.3			
	72	5	2.547	C	0.61			1.6			
	86	15	0.789	C	0.64			0.5			
	86	15	2.487	C	0.64			1.6			
	86	5	4.578	C	0.61			2.8			
	72	15	0.377	C	0.64			0.2			
	72	15	0.855	C	0.64			0.5			
	72	15	1.063	C	0.64			0.7			
	72	15	2.951	C	0.64			1.9			
3	72	15	3.605	C	0.64	36.0	41.3	2.3	0.63	0.95	**0.80**
	72	15	7.747	C	0.64			5.0			
	72	15	12.045	C	0.64			7.7			
	72	5	4.946	C	0.61			3.0			
	LrB	15	0.204	B	0.54			0.1			
	ReC	15	2.257	B	0.54			1.2			
	11	15	0.000	D	0.72			0.0			
	11	15	0.003	D	0.72			0.0			
	11	15	1.973	D	0.72			1.4			
	11	15	2.244	D	0.72			1.6			
	11	15	2.370	D	0.72			1.7			
	11	15	4.298	D	0.72			3.1			
	11	15	8.485	D	0.72			6.1			
	11	15	12.952	D	0.72			9.3			
	11	15	16.874	D	0.72			12.1			
	11	15	18.021	D	0.72			13.0			
	11	5	0.000	D	0.69			0.0			
	11	5	0.001	D	0.69			0.0			
	11	5	0.001	D	0.69			0.0			
	11	5	0.003	D	0.69			0.0			
	11	5	0.071	D	0.69			0.0			
	11	5	0.321	D	0.69			0.2			
	11	5	0.562	D	0.69			0.4			
	11	5	3.624	D	0.69			2.5			
	11	5	6.190	D	0.69			4.3			
	11	5	6.685	D	0.69			4.6			
	11	5	24.617	D	0.69			17.0			
	72	15	0.001	C	0.64			0.0			
	72	15	0.039	C	0.64			0.0			
	72	15	0.184	C	0.64			0.1			
	72	15	0.892	C	0.64			0.6			
	72	15	1.019	C	0.64			0.7			
	72	15	1.701	C	0.64			1.1			
	72	15	1.962	C	0.64			1.3			
	72	15	2.211	C	0.64			1.4			
	72	15	2.423	C	0.64			1.6			
	72	15	2.747	C	0.64			1.8			
	72	15	3.231	C	0.64			2.1			
	72	15	6.778	C	0.64			4.3			
	72	15	9.774	C	0.64			6.3			
4	72	15	18.340	C	0.64	347.3	271.4	11.7	0.65	0.95	**0.78**
	72	15	19.444	C	0.64			12.4			
	72	15	43.110	C	0.64			27.6			
	72	5	0.813	C	0.61			0.5			
	72	5	1.469	C	0.61			0.9			
	72	5	2.170	C	0.61			1.3			
	72	5	2.541	C	0.61			1.6			
	72	5	4.110	C	0.61			2.5			
	72	5	10.248	C	0.61			6.3			
	72	5	11.933	C	0.61			7.3			
	72	5	13.043	C	0.61			8.0			
	72	5	15.695	C	0.61			9.6			
	86	15	0.003	C	0.64			0.0			
	86	15	0.008	C	0.64			0.0			
	86	15	0.015	C	0.64			0.0			
	86	15	0.232	C	0.64			0.1			
	86	15	0.436	C	0.64			0.3			
	86	15	0.684	C	0.64			0.4			
	86	15	5.242	C	0.64			3.4			
	86	15	5.780	C	0.64			3.7			
	86	15	11.561	C	0.64			7.4			
	86	5	0.018	C	0.61			0.0			
	86	5	0.334	C	0.61			0.2			
	86	5	0.491	C	0.61			0.3			
	86	5	1.261	C	0.61			0.8			
	86	5	3.028	C	0.61			1.8			
	86	5	3.060	C	0.61			1.9			
	86	5	5.408	C	0.61			3.3			
	86	5	8.476	C	0.61			5.2			
	86	5	10.311	C	0.61			6.3			
	ClC	15	1.934	0	0.72			1.4			
	ClC	15	2.422	0	0.72			1.7			
	LeB	15	0.164	B	0.54			0.1			
	LeB	15	0.355	B	0.54			0.2			
	MhB	15	0.694	C	0.64			0.4			
	ReC	15	0.247	B	0.54			0.1			

	11	15	0.003	D	0.72			0.0		
	11	15	0.286	D	0.72			0.2		
	11	15	0.360	D	0.72			0.3		
	11	15	0.429	D	0.72			0.3		
	11	15	0.938	D	0.72			0.7		
	11	15	1.637	D	0.72			1.2		
	11	15	1.942	D	0.72			1.4		
	11	15	2.265	D	0.72			1.6		
	11	15	3.354	D	0.72			2.4		
	11	15	5.521	D	0.72			4.0		
	11	15	6.175	D	0.72			4.4		
	11	15	13.131	D	0.72			9.5		
	11	15	18.624	D	0.72			13.4		
	11	5	0.000	D	0.69			0.0		
	11	5	0.006	D	0.69			0.0		
	11	5	0.035	D	0.69			0.0		
	11	5	0.104	D	0.69			0.1		
	11	5	0.136	D	0.69			0.1		
	11	5	0.256	D	0.69			0.2		
	11	5	0.269	D	0.69			0.2		
	11	5	0.333	D	0.69			0.2		
	11	5	0.708	D	0.69			0.5		
	11	5	1.307	D	0.69			0.9		
	11	5	1.325	D	0.69			0.9		
	11	5	1.509	D	0.69			1.0		
	11	5	1.812	D	0.69			1.3		
	11	5	2.740	D	0.69			1.9		
	11	5	5.659	D	0.69			3.9		
	11	5	6.088	D	0.69			4.2		
	11	5	6.478	D	0.69			4.5		
	11	5	6.651	D	0.69			4.6		
	11	5	8.137	D	0.69			5.6		
	11	5	12.156	D	0.69			8.4		
	11	5	12.833	D	0.69			8.9		
	11	5	21.844	D	0.69			15.1		
	11	5	37.183	D	0.69			25.7		
	72	15	0.001	C	0.64			0.0		
	72	15	0.001	C	0.64			0.0		
	72	15	0.005	C	0.64			0.0		
	72	15	0.138	C	0.64			0.1		
	72	15	0.216	C	0.64			0.1		
	72	15	0.325	C	0.64			0.2		
	72	15	0.428	C	0.64			0.3		
	72	15	0.578	C	0.64			0.4		
	72	15	1.204	C	0.64			0.8		
	72	15	1.474	C	0.64			0.9		
5	72	15	1.664	C	0.64	350.7	242.7	1.1	0.65	0.95	**0.77**
	72	15	3.488	C	0.64			2.2		
	72	15	3.615	C	0.64			2.3		
	72	15	7.587	C	0.64			4.9		
	72	15	8.878	C	0.64			5.7		
	72	5	0.000	C	0.61			0.0		
	72	5	0.001	C	0.61			0.0		
	72	5	0.001	C	0.61			0.0		
	72	5	0.005	C	0.61			0.0		
	72	5	0.015	C	0.61			0.0		
	72	5	0.062	C	0.61			0.0		
	72	5	0.079	C	0.61			0.0		
	72	5	0.079	C	0.61			0.0		
	72	5	0.193	C	0.61			0.1		
	72	5	0.280	C	0.61			0.2		
	72	5	0.377	C	0.61			0.2		
	72	5	1.169	C	0.61			0.7		
	72	5	3.366	C	0.61			2.1		
	72	5	5.183	C	0.61			3.2		
	72	5	5.283	C	0.61			3.2		
	72	5	10.040	C	0.61			6.1		
	78	15	7.948	B	0.54			4.3		
	78	5	0.244	B	0.49			0.1		
	78	5	0.834	B	0.49			0.4		
	78	5	16.441	B	0.49			8.1		
	86	15	0.001	C	0.64			0.0		
	86	15	0.008	C	0.64			0.0		
	86	15	0.015	C	0.64			0.0		
	86	15	0.052	C	0.64			0.0		
	86	15	0.738	C	0.64			0.5		
	86	15	0.988	C	0.64			0.6		
	86	15	2.153	C	0.64			1.4		
	86	15	2.257	C	0.64			1.4		
	86	15	7.743	C	0.64			5.0		
	86	15	13.976	C	0.64			8.9		
	86	5	0.001	C	0.61			0.0		
	86	5	0.001	C	0.61			0.0		
	86	5	0.174	C	0.61			0.1		
	86	5	0.212	C	0.61			0.1		
	86	5	0.290	C	0.61			0.2		
	86	5	1.560	C	0.61			1.0		
	86	5	1.609	C	0.61			1.0		
	86	5	1.816	C	0.61			1.1		
	86	5	1.955	C	0.61			1.2		
	86	5	2.517	C	0.61			1.5		
	86	5	10.812	C	0.61			6.6		
	86	5	17.964	C	0.61			11.0		
	86	5	20.383	C	0.61			12.4		
	11	5	0.000	D	0.69			0.0		
	11	5	0.000	D	0.69			0.0		
	11	5	0.001	D	0.69			0.0		
	11	5	0.001	D	0.69			0.0		
	11	5	0.003	D	0.69			0.0		
	11	5	0.857	D	0.69			0.6		
6	11	5	5.435	D	0.69	22.7	42.1	3.8	0.69	0.95	**0.86**
	11	5	15.088	D	0.69			10.4		
	72	5	0.000	C	0.61			0.0		
	72	5	0.000	C	0.61			0.0		
	72	5	0.001	C	0.61			0.0		
	72	5	0.002	C	0.61			0.0		
	72	5	0.470	C	0.61			0.3		
	CIC	15	0.859	0	0.72			0.6		

DA - Proposed	MUSYM	LU_Type	Pervious Area (acres)	SCS Designation	C	Total Pervious Area (acres)	Total Impervious Area (acres)	C*A Pervious	Cw Pervious	Cw Impervious	Weighted C-Value
	11	5	11.429	D	0.69			7.89			
	11	15	0.656	D	0.72			0.47			
	11	15	0.332	D	0.72			0.24			
	11	15	2.964	D	0.72			2.13			
	11	15	0.503	D	0.72			0.36			
	11	15	0.143	D	0.72			0.10			
	11	15	2.337	D	0.72			1.68			
	72	5	7.918	C	0.61			4.83			
1	72	15	0.558	C	0.64	32.6	9.2	0.36	0.67	0.95	0.73
	72	15	1.137	C	0.64			0.73			
	72	15	0.766	C	0.64			0.49			
	72	15	1.660	C	0.64			1.06			
	86	5	1.696	C	0.61			1.03			
	86	15	0.473	C	0.64			0.30			
	11	5	0.004	D	0.69			0.00			
	11	15	0.004	D	0.72			0.00			
	11	15	1.127	D	0.72			0.81			
	11	15	1.236	D	0.72			0.89			
	11	15	1.210	D	0.72			0.87			
	11	15	12.409	D	0.72			8.93			
	11	15	0.020	D	0.72			0.01			
	11	15	0.020	D	0.72			0.01			
	72	5	0.196	C	0.61			0.12			
	72	5	0.072	C	0.61			0.04			
	72	5	2.160	C	0.61			1.32			
	72	5	2.547	C	0.61			1.55			
	72	15	1.052	C	0.64			0.67			
	72	15	2.896	C	0.64			1.85			
2	72	15	0.785	C	0.64	54.5	106.4	0.50	0.66	0.95	0.85
	72	15	0.308	C	0.64			0.20			
	72	15	0.618	C	0.64			0.40			
	72	15	1.715	C	0.64			1.10			
	72	15	6.625	C	0.64			4.24			
	72	15	2.186	C	0.64			1.40			
	72	15	2.403	C	0.64			1.54			
	72	15	1.892	C	0.64			1.21			
	11	5	3.848	D	0.69			2.66			
	11	15	1.290	D	0.72			0.93			
	86	5	4.578	C	0.61			2.79			
	86	15	0.789	C	0.64			0.50			
	86	15	2.487	C	0.64			1.59			
	ReC	15	2.257	B	0.54			1.22			
	LrB	15	0.204	B	0.54			0.11			
	72	5	4.946	C	0.61			3.02			
	72	15	12.045	C	0.64			7.71			
3	72	15	0.377	C	0.64	36.0	41.3	0.24	0.63	0.95	0.80
	72	15	1.063	C	0.64			0.68			
	72	15	2.951	C	0.64			1.89			
	72	15	7.747	C	0.64			4.96			
	72	15	3.605	C	0.64			2.31			
	72	15	0.855	C	0.64			0.55			
	MhB	15	0.694	C	0.64			0.44			
	LeB	15	0.355	B	0.54			0.19			
	LeB	15	0.164	B	0.54			0.09			
	ClC	15	2.422	0	0.72			1.74			
	ClC	15	1.934	0	0.72			1.39			
	ReC	15	0.247	B	0.54			0.13			
	11	60	2.729	D	0.84			2.29			
	11	60	1.469	D	0.84			1.23			
	11	60	3.230	D	0.84			2.71			
	11	60	1.818	D	0.84			1.53			
	11	60	9.442	D	0.84			7.93			
	11	60	2.503	D	0.84			2.10			
	11	60	9.412	D	0.84			7.91			
	11	60	7.881	D	0.84			6.62			
	11	60	0.112	D	0.84			0.09			
	72	5	13.043	C	0.61			7.96			
	72	5	4.196	C	0.61			2.56			
	72	5	11.933	C	0.61			7.28			
	72	5	1.469	C	0.61			0.90			
	72	15	29.254	C	0.64			18.72			
	72	15	9.774	C	0.64			6.26			
	72	15	6.778	C	0.64			4.34			
	72	15	1.701	C	0.64			1.09			
	72	15	0.892	C	0.64			0.57			
	72	15	2.194	C	0.64			1.40			
	72	15	1.962	C	0.64			1.26			
	72	15	3.231	C	0.64			2.07			
	72	15	0.453	C	0.64			0.29			
	72	15	0.184	C	0.64			0.12			
	72	15	0.039	C	0.64			0.02			
	72	60	2.798	C	0.81			2.27			
	72	60	3.232	C	0.81			2.62			
	72	60	2.900	C	0.81			2.35			
	72	60	1.456	C	0.81			1.18			
	72	60	16.058	C	0.81			13.01			
4	72	60	3.369	C	0.81	294.6	294.3	2.73	0.71	0.95	0.83
	72	60	0.099	C	0.81			0.08			
	72	60	2.638	C	0.81			2.14			
	72	60	12.618	C	0.81			10.22			
	72	60	9.269	C	0.81			7.51			
	11	5	3.624	D	0.69			2.50			
	11	5	0.071	D	0.69			0.05			
	11	15	1.973	D	0.72			1.42			
	11	15	8.485	D	0.72			6.11			
	11	5	24.617	D	0.69			16.99			
	11	5	0.562	D	0.69			0.39			
	11	5	6.685	D	0.69			4.61			
	11	5	6.190	D	0.69			4.27			
	11	15	0.000	D	0.72			0.00			
	72	5	0.813	C	0.61			0.50			
	72	5	4.110	C	0.61			2.51			
	72	5	2.541	C	0.61			1.55			
	11	5	0.321	D	0.69			0.22			
	86	5	3.332	C	0.61			2.03			
	86	15	0.684	C	0.64			0.44			
	86	15	0.232	C	0.64			0.15			
	86	15	5.242	C	0.64			3.35			
	86	15	0.866	C	0.64			0.55			
	86	60	15.152	C	0.81			12.27			
	86	5	0.334	C	0.61			0.20			
	86	5	0.491	C	0.61			0.30			
	86	5	8.476	C	0.61			5.17			
	86	5	3.060	C	0.61			1.87			
	86	5	10.311	C	0.61			6.29			
	86	5	0.018	C	0.61			0.01			
	86	15	0.436	C	0.64			0.28			
	86	15	0.003	C	0.64			0.00			
	72	5	0.001	C	0.61			0.00			
	11	5	0.001	D	0.69			0.00			
	11	5	0.000	D	0.69			0.00			
	11	5	0.001	D	0.69			0.00			
	11	5	0.003	D	0.69			0.00			

	11	5	6.478	D	0.69			4.47			
	11	5	1.325	D	0.69			0.91			
	11	60	3.690	D	0.84			3.10			
	11	60	8.159	D	0.84			6.85			
	11	60	8.402	D	0.84			7.06			
	11	60	9.723	D	0.84			8.17			
	11	60	0.230	D	0.84			0.19			
	11	60	5.657	D	0.84			4.75			
	72	5	0.013	C	0.61			0.01			
	72	5	4.004	C	0.61			2.44			
	72	5	0.512	C	0.61			0.31			
	72	5	0.062	C	0.61			0.04			
	72	15	1.369	C	0.64			0.88			
	72	60	12.013	C	0.81			9.73			
	72	60	0.383	C	0.81			0.31			
	72	60	5.435	C	0.81			4.40			
	72	60	0.063	C	0.81			0.05			
	72	60	4.315	C	0.81			3.50			
	72	60	0.105	C	0.81			0.08			
	11	5	0.104	D	0.69			0.07			
	72	5	0.015	C	0.61			0.01			
	72	5	0.079	C	0.61			0.05			
	72	5	3.366	C	0.61			2.05			
	72	5	0.193	C	0.61			0.12			
	72	5	5.283	C	0.61			3.22			
	72	5	5.183	C	0.61			3.16			
	72	5	0.079	C	0.61			0.05			
	72	5	0.377	C	0.61			0.23			
	72	15	1.204	C	0.64			0.77			
	72	15	0.578	C	0.64			0.37			
	72	15	3.488	C	0.64			2.23			
	72	15	0.428	C	0.64			0.27			
	72	15	0.216	C	0.64			0.14			
	72	15	0.325	C	0.64			0.21			
	72	15	3.615	C	0.64			2.31			
	11	5	1.509	D	0.69			1.04			
	11	5	12.156	D	0.69			8.39			
	11	5	0.333	D	0.69			0.23			
	11	5	6.088	D	0.69			4.20			
	11	5	0.035	D	0.69			0.02			
	11	5	5.659	D	0.69			3.90			
	11	5	1.812	D	0.69			1.25			
	11	5	0.256	D	0.69			0.18			
	11	5	0.006	D	0.69			0.00			
	11	5	7.891	D	0.69			5.44			
	11	5	21.844	D	0.69			15.07			
	11	5	6.651	D	0.69			4.59			
	11	5	12.833	D	0.69			8.86			
	11	5	27.423	D	0.69			18.92			
	11	5	2.740	D	0.69			1.89			
	11	5	1.307	D	0.69			0.90			
	11	5	0.136	D	0.69			0.09			
5	11	5	0.269	D	0.69	324.8	298.3	0.19	0.69	0.95	0.81
	11	15	1.637	D	0.72			1.18			
	11	15	3.354	D	0.72			2.41			
	11	15	0.286	D	0.72			0.21			
	11	15	0.360	D	0.72			0.26			
	11	15	2.265	D	0.72			1.63			
	11	15	6.175	D	0.72			4.45			
	11	15	0.938	D	0.72			0.68			
	11	60	0.419	D	0.84			0.35			
	11	60	1.880	D	0.84			1.58			
	78	5	0.244	B	0.49			0.12			
	78	5	16.441	B	0.49			8.06			
	78	5	0.834	B	0.49			0.41			
	78	15	7.948	B	0.54			4.29			
	86	5	2.076	C	0.61			1.27			
	86	5	17.439	C	0.61			10.64			
	86	5	1.955	C	0.61			1.19			
	86	5	1.816	C	0.61			1.11			
	86	5	0.290	C	0.61			0.18			
	86	5	2.517	C	0.61			1.54			
	86	5	3.011	C	0.61			1.84			
	86	5	2.665	C	0.61			1.63			
	86	5	1.609	C	0.61			0.98			
	86	5	0.559	C	0.61			0.34			
	86	5	0.001	C	0.61			0.00			
	86	5	5.273	C	0.61			3.22			
	86	5	0.174	C	0.61			0.11			
	86	15	7.090	C	0.64			4.54			
	86	15	2.257	C	0.64			1.44			
	86	15	0.209	C	0.64			0.13			
	86	15	0.155	C	0.64			0.10			
	86	15	8.552	C	0.64			5.47			
	86	15	0.738	C	0.64			0.47			
	86	60	0.098	C	0.81			0.08			
	86	60	7.576	C	0.81			6.14			
	86	60	0.123	C	0.81			0.10			
	86	60	0.119	C	0.81			0.10			
	86	60	5.076	C	0.81			4.11			
	86	60	1.554	C	0.81			1.26			
	86	60	1.900	C	0.81			1.54			
	86	60	0.009	C	0.81			0.01			
	86	5	1.560	C	0.61			0.95			
	86	5	0.212	C	0.61			0.13			
	72	5	0.001	C	0.61			0.00			
	11	5	0.000	D	0.69			0.00			
	72	5	0.001	C	0.61			0.00			
	72	5	0.000	C	0.61			0.00			
	72	5	0.005	C	0.61			0.00			
	72	5	0.001	C	0.61			0.00			
	72	15	0.005	C	0.64			0.00			
	72	15	0.001	C	0.64			0.00			
	86	5	0.001	C	0.61			0.00			
	86	15	0.001	C	0.64			0.00			
	ClC	15	0.859	0	0.72			0.62			
	11	5	0.857	D	0.69			0.59			
	11	5	5.435	D	0.69			3.75			
	11	5	15.088	D	0.69			10.41			
	72	5	0.000	C	0.61			0.00			
	72	5	0.470	C	0.61			0.29			
	72	5	0.002	C	0.61			0.00			
6	11	5	0.000	D	0.69	22.7	42.1	0.00	0.69	0.95	0.86
	11	5	0.001	D	0.69			0.00			
	11	5	0.000	D	0.69			0.00			
	11	5	0.001	D	0.69			0.00			
	11	5	0.003	D	0.69			0.00			
	72	5	0.001	C	0.61			0.00			
	72	5	0.000	C	0.61			0.00			

Appendix B – Basin Sizing

Project: Tucson Int. Airport
Location: Tucson, Arizona
Date: November 21, 2017
Subject: Retention Basin Sizing
Contributing Sub-Basins: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15

Proj. Number: 551424
Proj. Engineer: Cole Cooper
Checker: Lloyd Vick

Tucson Int. Airport - Basin 1			
CONTOUR ELEVATION	AREA	VOLUME PROVIDED (CFT)	VOLUME PROVIDED (Ac-Ft)
2557	25,256	24,070	0.5526
2556	22,884	21,748	0.4993
2555	20,612	0	0.0000
		0	0.0000
		0	0.0000
		0	0.0000
		0	0.0000
			0.0000

Volume Required (ac-ft):
100-yr: 0.8 ac-ft

Total Volume= 45,818 1.1

Note:

1) Average End Area Method Utilized for Calculating Volume Provided

Project: Tucson Int. Airport
Location: Tucson, Arizona
Date: November 21, 2017
Subject: Retention Basin Sizing
Contributing Sub-Basins: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15

Proj. Number: 551424
Proj. Engineer: Cole Cooper
Checker: Lloyd Vick

Tucson Int. Airport - Basin 1			
CONTOUR ELEVATION	AREA	VOLUME PROVIDED (CFT)	VOLUME PROVIDED (Ac-Ft)
2595	139,757	136,686	3.1379
2594	133,615	130,595	2.9980
2593	127,575	124,583	2.8600
2592	121,590	118,666	2.7242
2591	115,741	0	0.0000
		0	0.0000
		0	0.0000
			0.0000

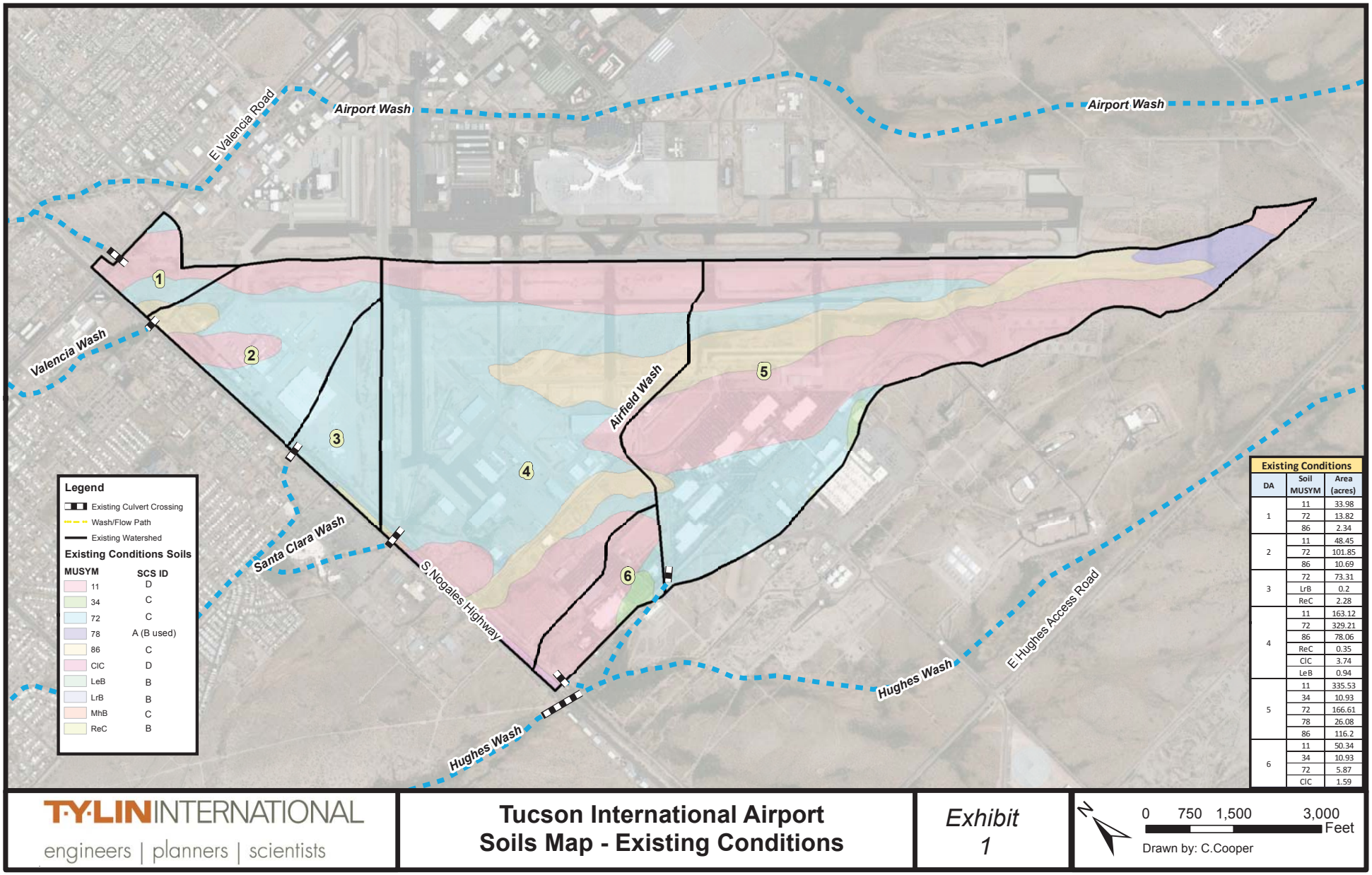
Volume Required (ac-ft):
100-yr: 10.8 ac-ft

Total Volume= 510,529 11.7

Note:
1) Average End Area Method Utilized for Calculating Volume Provided

Appendix C – Exhibits

Appendix C.1 – Exhibit 1 – Soils Map – Existing Conditions



Existing Conditions

DA	Soil MUSYM	Area (acres)
1	11	33.98
	72	13.82
	86	2.34
2	11	48.45
	72	101.85
	86	10.69
3	72	73.31
	LrB	0.2
	ReC	2.28
4	11	163.12
	72	329.21
	86	78.06
	ReC	0.35
	ClC	3.74
	LeB	0.94
5	11	335.53
	34	10.93
	72	166.61
	78	26.08
	86	116.2
6	11	50.34
	34	10.93
	72	5.87
	ClC	1.59

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Tucson International Airport
Soils Map - Existing Conditions

Exhibit 1

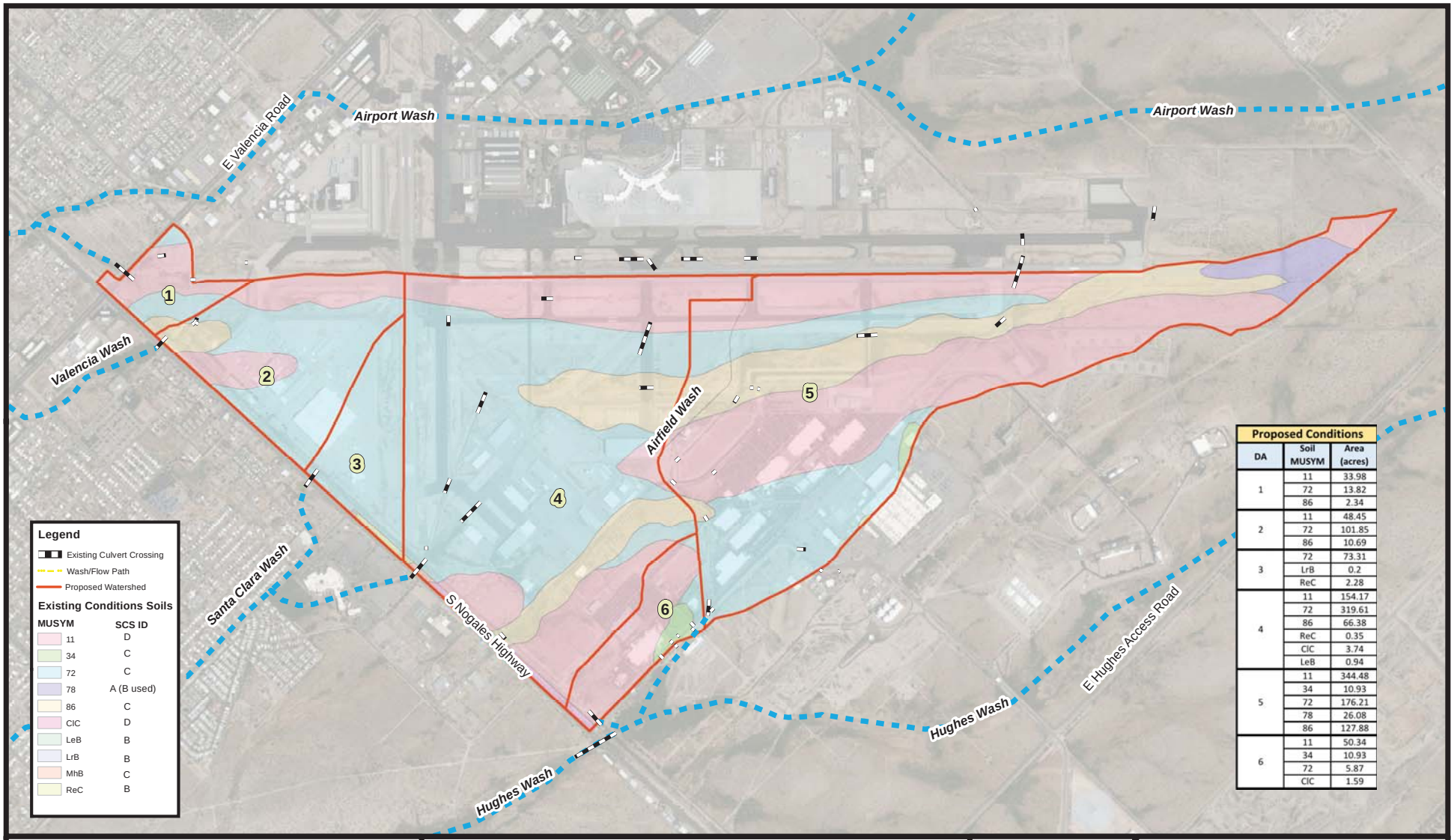
0 750 1,500 3,000 Feet

Drawn by: C.Cooper

Date: 11/22/2017

Document Path: T:\Tempe\Legacy\New Projects\PSH\A Infield\Tucson TIA\Working\GIS\Finalized Exhibits\Soils Map.mxd

Appendix C.2 – Soils Map – Proposed Conditions



Proposed Conditions

DA	Soil MUSYM	Area (acres)
1	11	33.98
	72	13.82
	86	2.34
2	11	48.45
	72	101.85
	86	10.69
3	72	73.31
	LrB	0.2
	ReC	2.28
4	11	154.17
	72	319.61
	86	66.38
	ReC	0.35
	CIC	3.74
	LeB	0.94
5	11	344.48
	34	10.93
	72	176.21
	78	26.08
	86	127.88
6	11	50.34
	34	10.93
	72	5.87
	CIC	1.59

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Tucson International Airport
Soils Map - Proposed Conditions

Exhibit 2

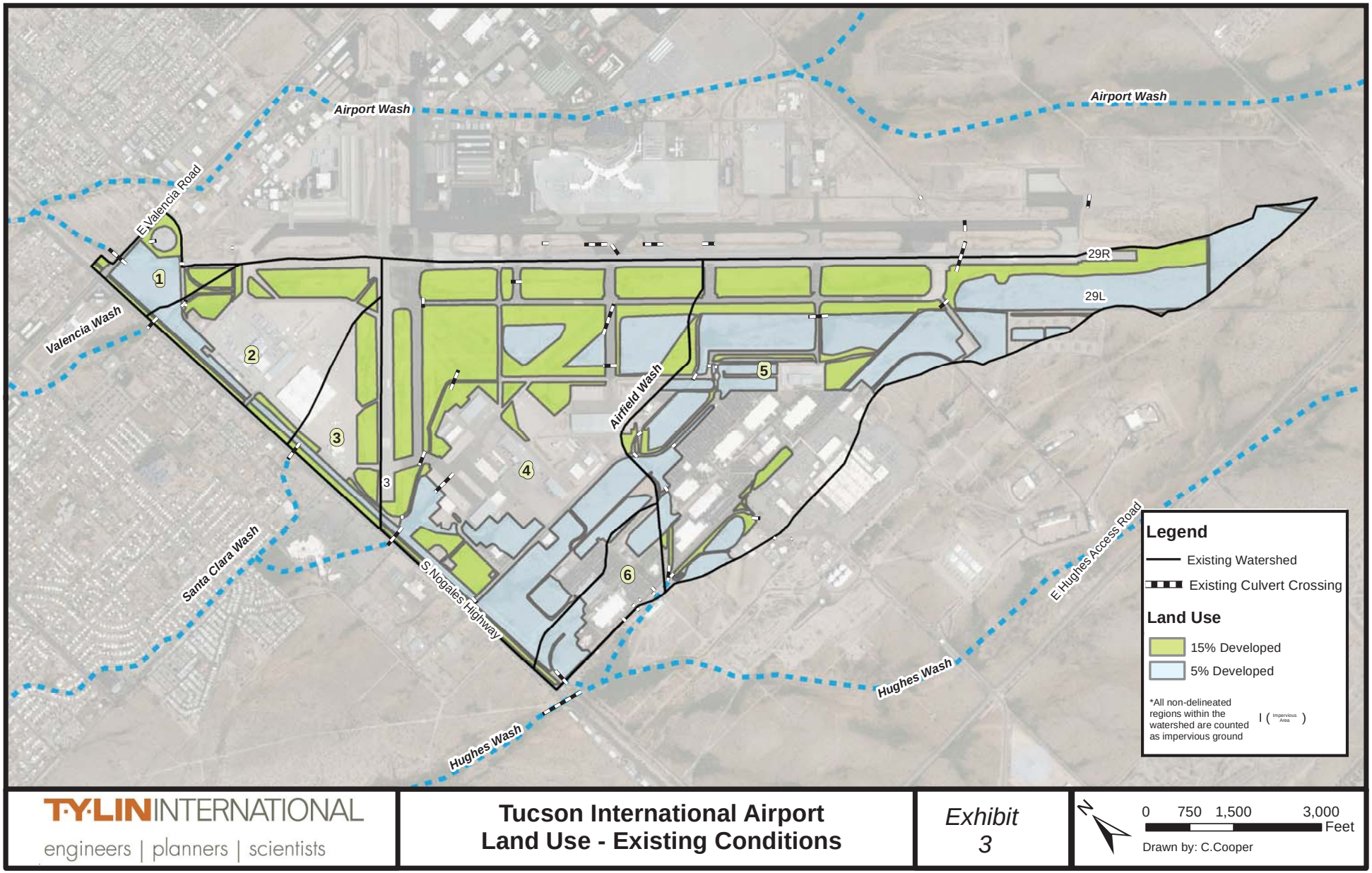
N

0 750 1,500 3,000 Feet

Drawn by: C.Cooper

Date: 11/30/2017

Appendix C.3 – Land Use – Existing Conditions



Date: 11/30/2017

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Tucson International Airport
Land Use - Existing Conditions

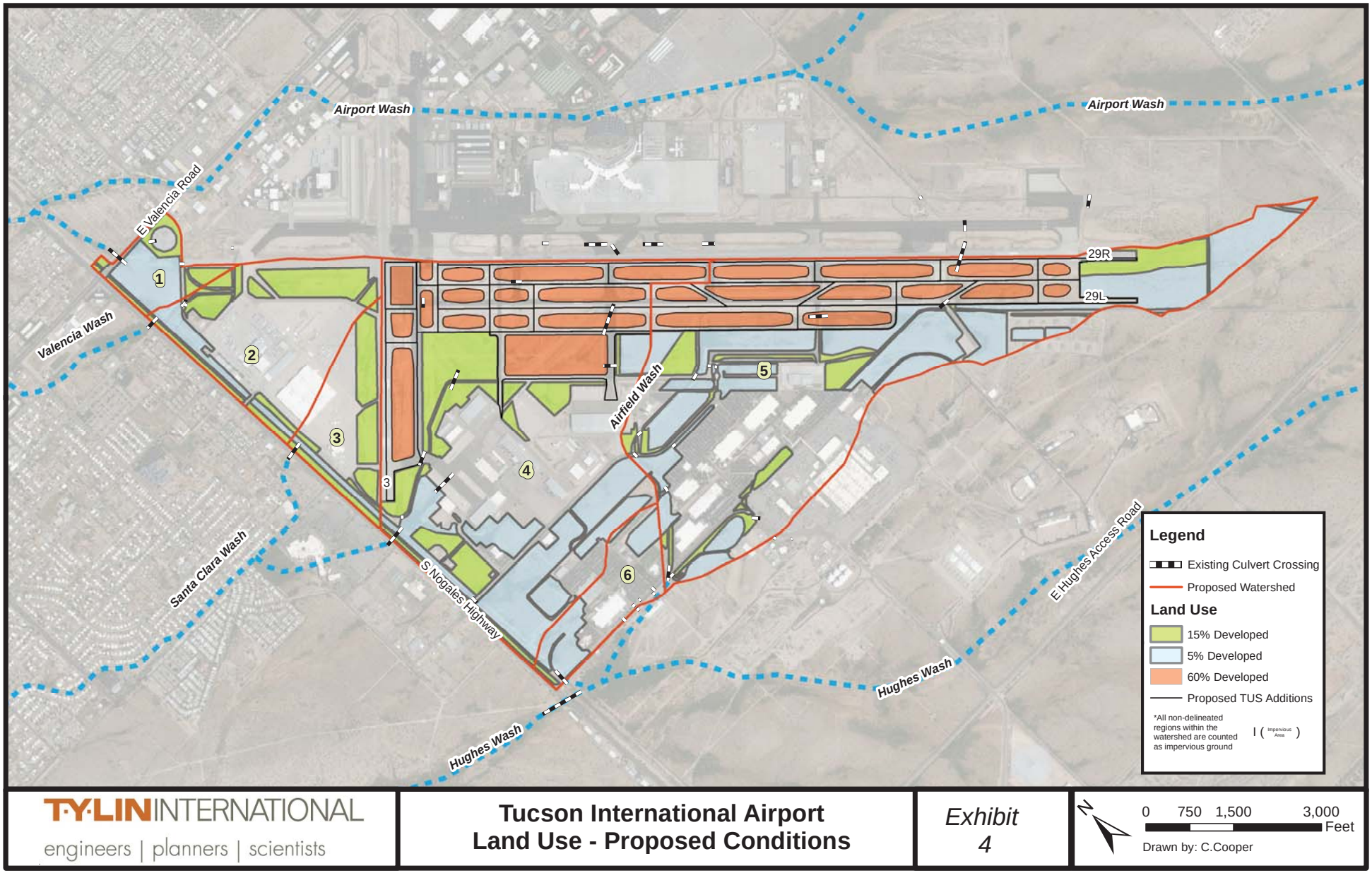
Exhibit 3

N

0 750 1,500 3,000 Feet

Drawn by: C.Cooper

Appendix C.4 – Land Use – Proposed Conditions



Date: 11/30/2017

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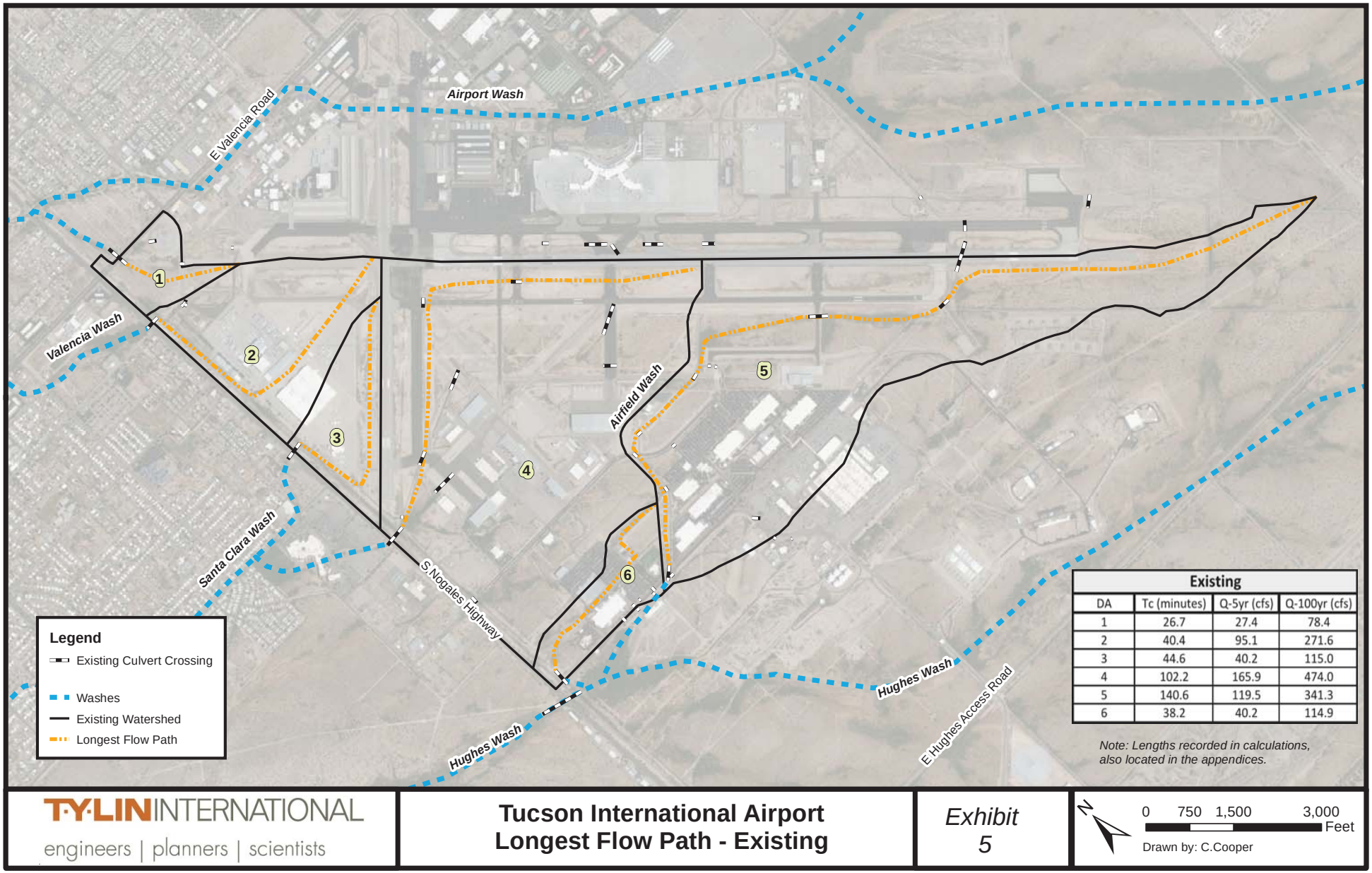
Tucson International Airport
Land Use - Proposed Conditions

Exhibit 4

0 750 1,500 3,000 Feet

Drawn by: C.Cooper

Appendix C.5 – Longest Flow Path - Existing



Existing			
DA	Tc (minutes)	Q-5yr (cfs)	Q-100yr (cfs)
1	26.7	27.4	78.4
2	40.4	95.1	271.6
3	44.6	40.2	115.0
4	102.2	165.9	474.0
5	140.6	119.5	341.3
6	38.2	40.2	114.9

Note: Lengths recorded in calculations, also located in the appendices.

Date: 11/30/2017

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Longest Flow Path - Existing

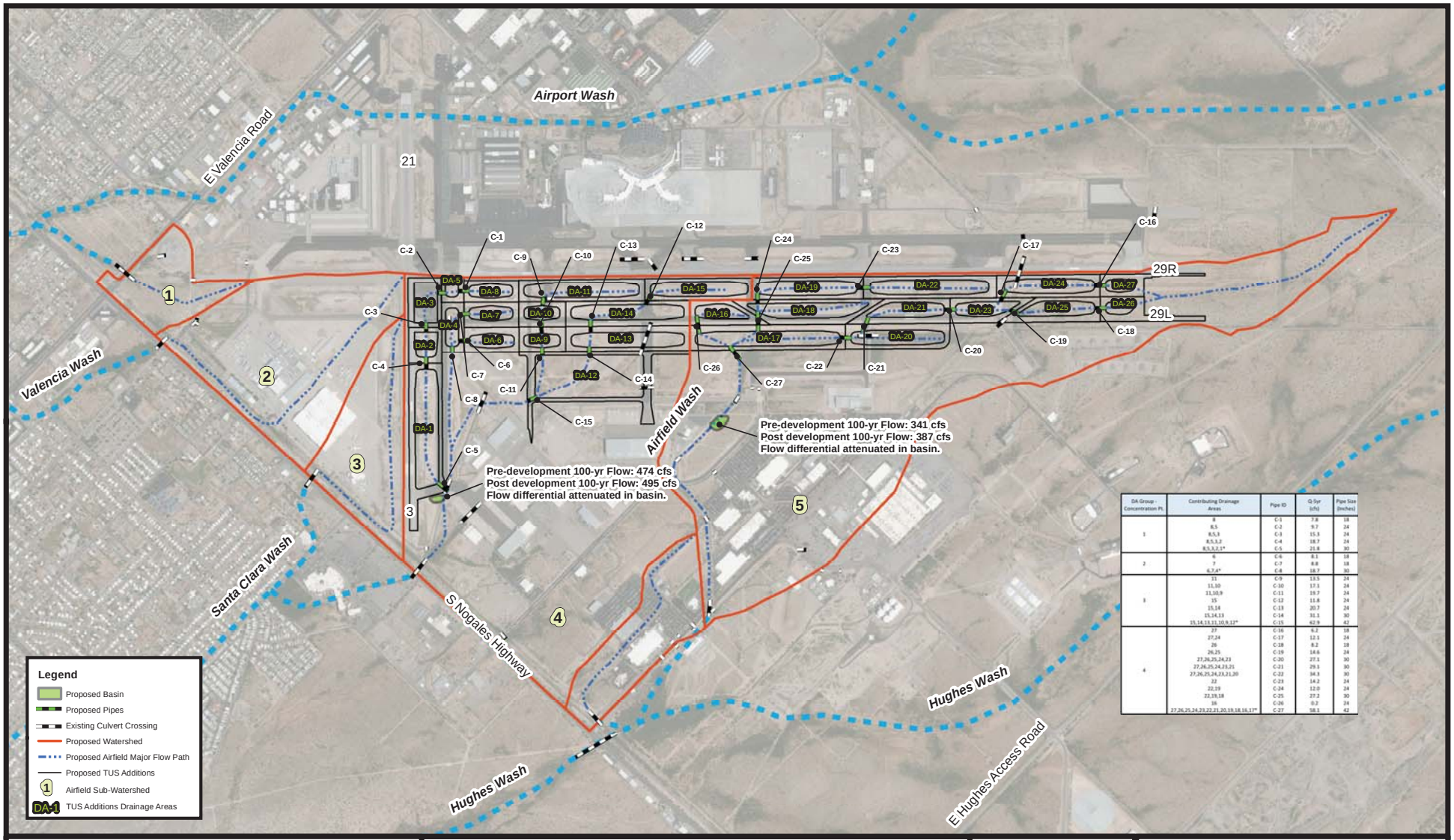
Exhibit 5

N

0 750 1,500 3,000 Feet

Drawn by: C.Cooper

Appendix C.6 – Proposed Conditions - Workmap



Date: 11/30/2017

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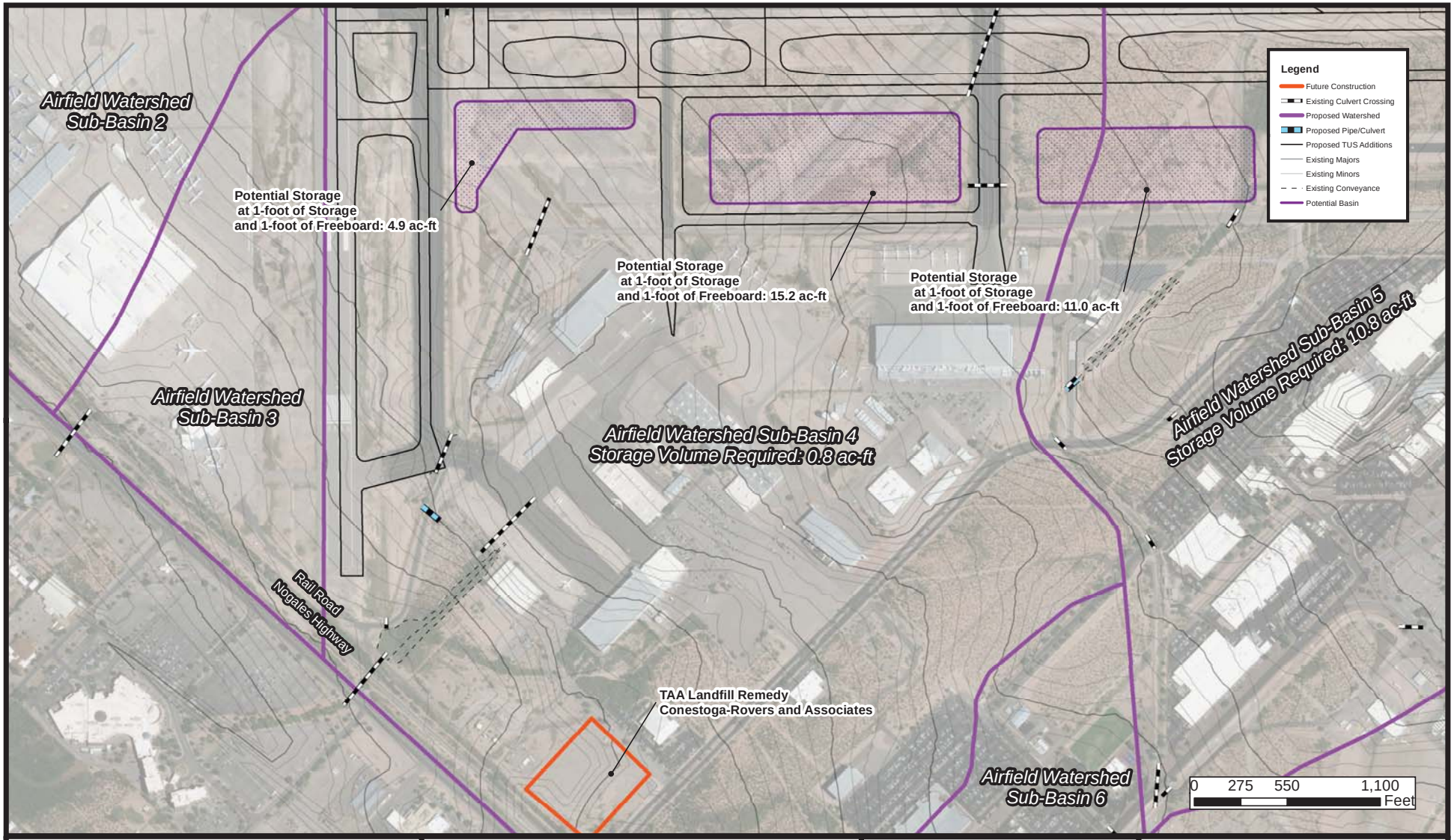
Tucson International Airport
Proposed Conditions - Workmap

Exhibit 6

0 750 1,500 3,000 Feet

Drawn by: C.Cooper

Appendix C.7 – Basin Exhibit



Date: 1/18/2018

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Potential Basin Locations Exhibit

Exhibit 7

Drawn by: C.Cooper

Appendix D – FlowMaster (Pipe Sizing)

Pipe Sizing - TIA Report

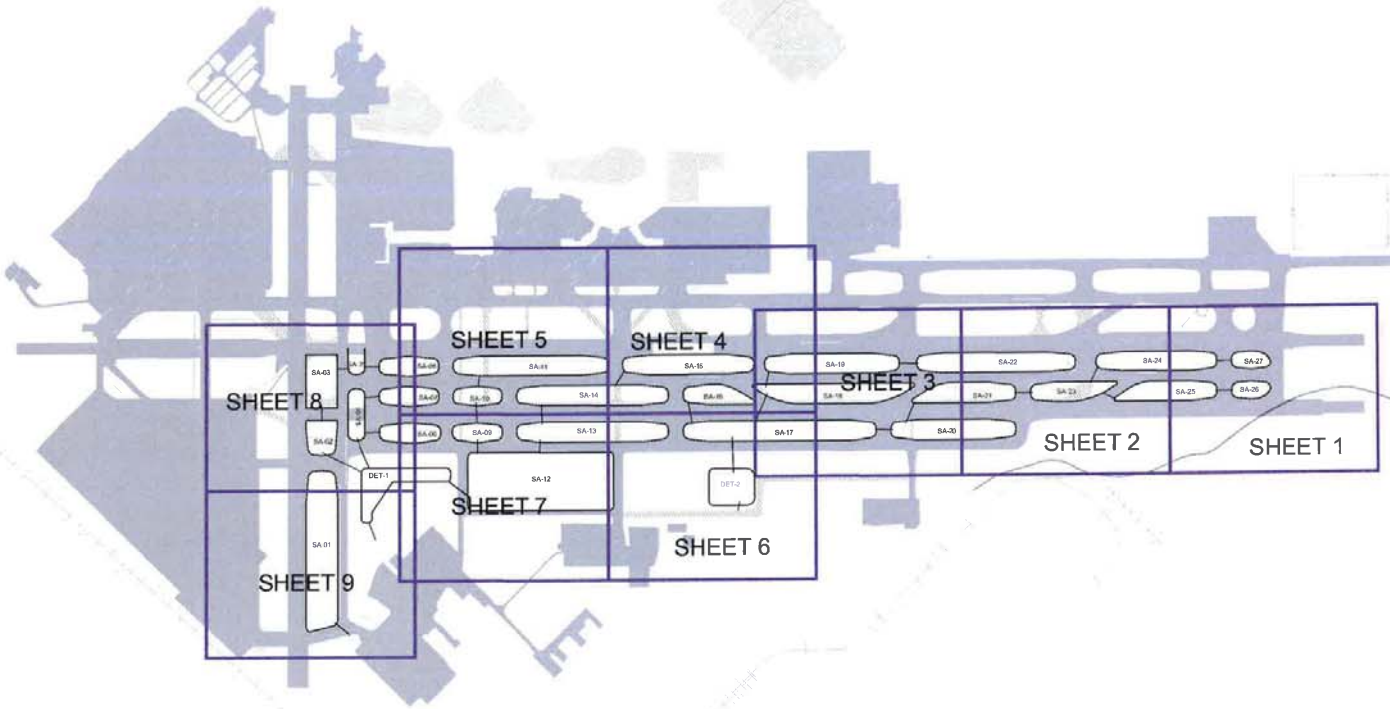
Label	Roughness Coefficient	Channel Slope (ft/ft)	Diameter (ft)
DA - 8	0.013	0.00980	1.50
DA - 8,5	0.013	0.00500	2.00
DA - 8,5,3	0.013	0.00710	2.00
DA - 8,5,3,2	0.013	0.00660	2.00
DA - 8,5,3,2,1	0.013	0.00390	2.50
DA - 6	0.013	0.00600	1.50
DA - 7	0.013	0.00610	1.50
DA - 6,7,4	0.013	0.00540	2.50
DA - 11	0.013	0.00720	2.00
DA - 11,10	0.013	0.00720	2.00
DA - 11,10,9	0.013	0.00840	2.00
DA - 15	0.013	0.00730	2.00
DA - 15,14	0.013	0.00730	2.00
DA - 15,14,13	0.013	0.00680	2.50
DA - 15,14,13,11,10,9,12	0.013	0.00700	3.50
DA - 27	0.013	0.01230	1.50
DA - 27,24	0.013	0.00390	2.00
DA - 26	0.013	0.01230	1.50
DA - 26,25	0.013	0.00440	2.00
DA - 27,26,25,24,23	0.013	0.00380	2.50
DA - 27,26,25,24,23,21	0.013	0.00580	2.50
DA - 27,26,25,24,23,21,20	0.013	0.00860	2.50
DA - 22	0.013	0.00690	2.00
DA - 19	0.013	0.00700	2.00
DA - 22,19,18	0.013	0.00480	2.50
DA - 27,26,25,24,23,22,21,20,19,18,17,16	0.013	0.00490	3.50
DA - 16	0.013	0.00500	2.00
Basin - 1	0.013	0.00840	1.00
Basin - 2	0.013	0.00190	1.50

Pipe Sizing - TIA Report

Discharge (ft^3/s)	Flow Area (ft^2)	Velocity (ft/s)
7.80	1.21	6.46
9.70	1.82	5.34
15.30	2.27	6.74
18.70	2.81	6.66
21.80	3.72	5.86
8.10	1.54	5.25
8.80	1.70	5.18
18.70	2.89	6.47
13.50	2.04	6.62
17.10	2.48	6.91
19.70	2.62	7.51
11.80	1.83	6.46
20.70	3.01	6.88
31.10	3.98	7.82
62.90	6.56	9.59
6.20	0.93	6.70
12.10	2.39	5.05
8.20	1.15	7.14
14.60	2.68	5.44
27.10	4.71	5.76
29.10	4.03	7.23
34.30	3.91	8.77
14.20	2.16	6.57
12.00	1.88	6.38
27.20	4.13	6.59
58.10	7.11	8.18
8.20	1.60	5.12
3.48	0.74	4.67
3.98	1.36	2.92

Pipe Sizing - TIA Report

Discharge (ft^3/s)	Flow Area (ft^2)	Velocity (ft/s)



*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

750 0 750 1500
SCALE IN FEET

PLANS PREPARED BY:
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NO.	REVISIONS / SUBMISSIONS	DATE

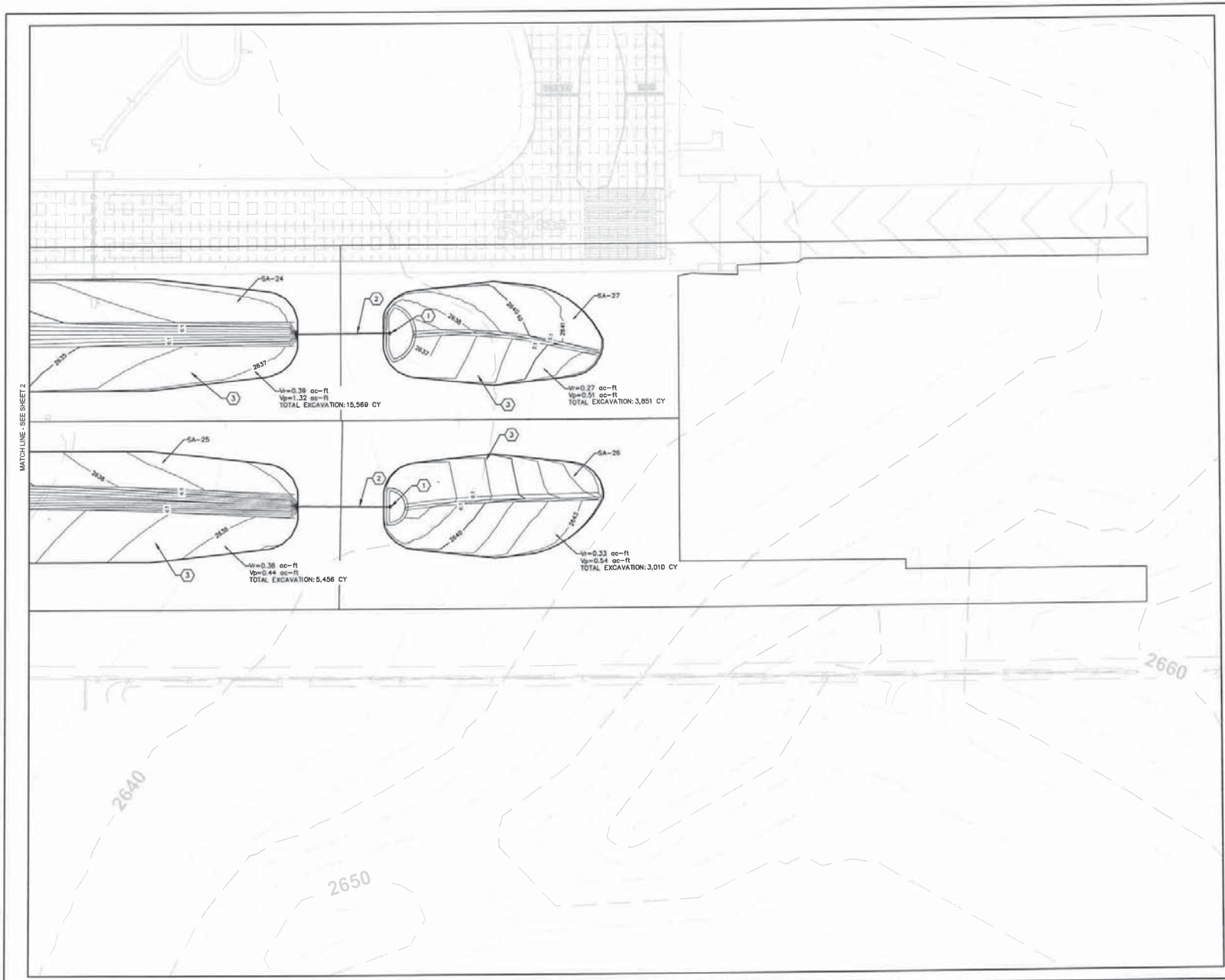
TUCSON AIRPORT AUTHORITY
TUCSON INTERNATIONAL AIRPORT RYAN AIRFIELD

TUS EIS PHASE II - 25% AIRFIELD DESIGN

SHEET OVERVIEW TITLE

DESIGNED BY: CSC
DRAWN BY: CSC
CHECKED BY: LAV
DATE: 1-15-2018
SCALE AS INDICATED
TAA PROJ.# 10112255 EIS

KEY MAP



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	2 EA
2	FURNISH AND INSTALL 18" CLASS V RGRCP	400 LF
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

100 0 100 200
SCALE IN FEET

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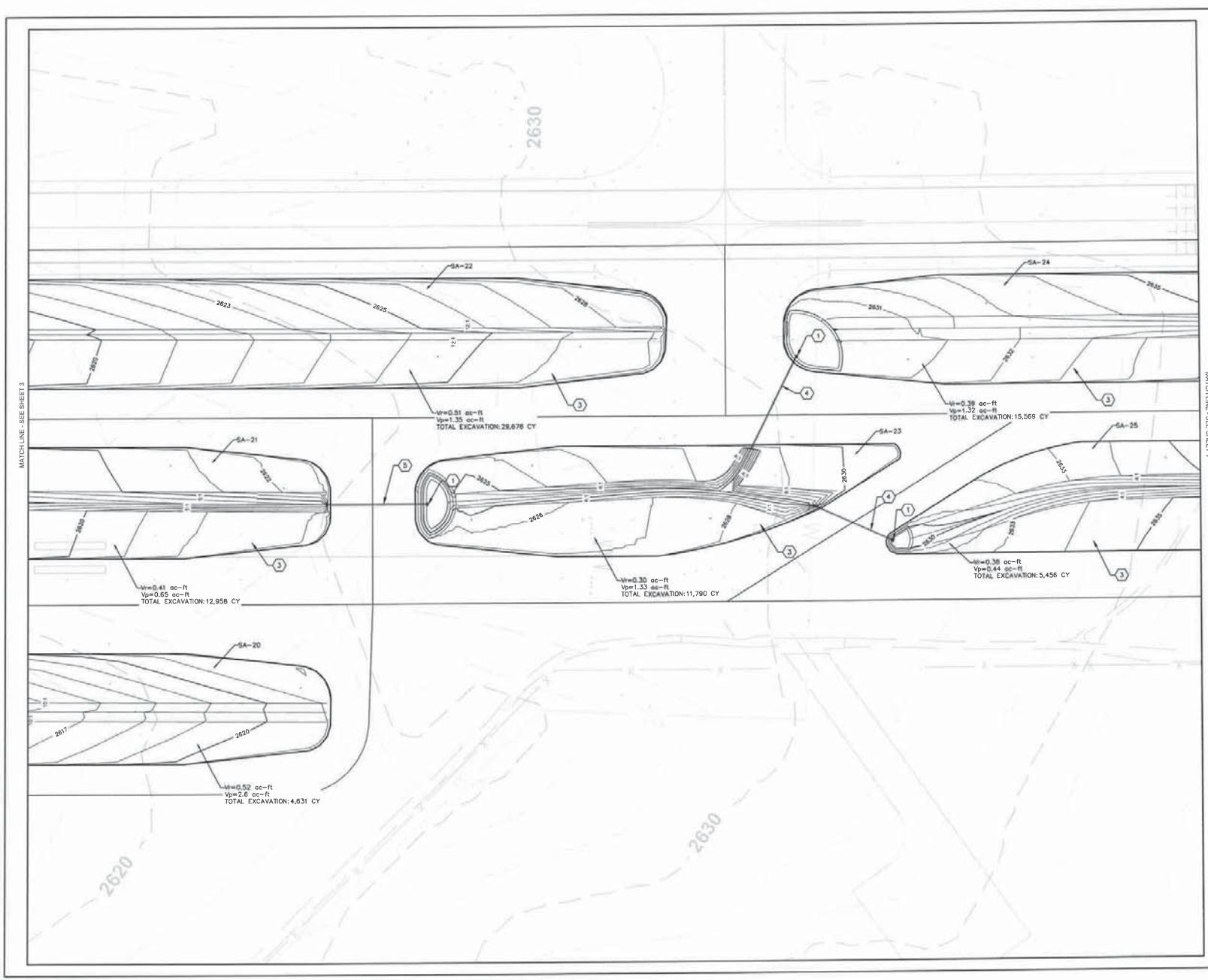
TUCSON
AIRPORT AUTHORITY
TUCSON INTERNATIONAL AIRPORT RYAN AIRFIELD
TUS EIS PHASE II - 25% AIRFIELD DESIGN

DESIGNED BY: DSC
DRAWN BY: DSC
CHECKED BY: LAV
DATE: 1-26-2018
SCALE: AS INDICATED
TAA PROJ.# 10112255 EIS

SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:
SHEET 1 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	3 EA
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	388 LF
5	FURNISH AND INSTALL 30" CLASS V RGRCP	200 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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SCALE IN FEET

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TUCSON
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TUCSON INTERNATIONAL AIRPORT RYAN AIRFIELD

TUS EIS PHASE II - 25% AIRFIELD DESIGN

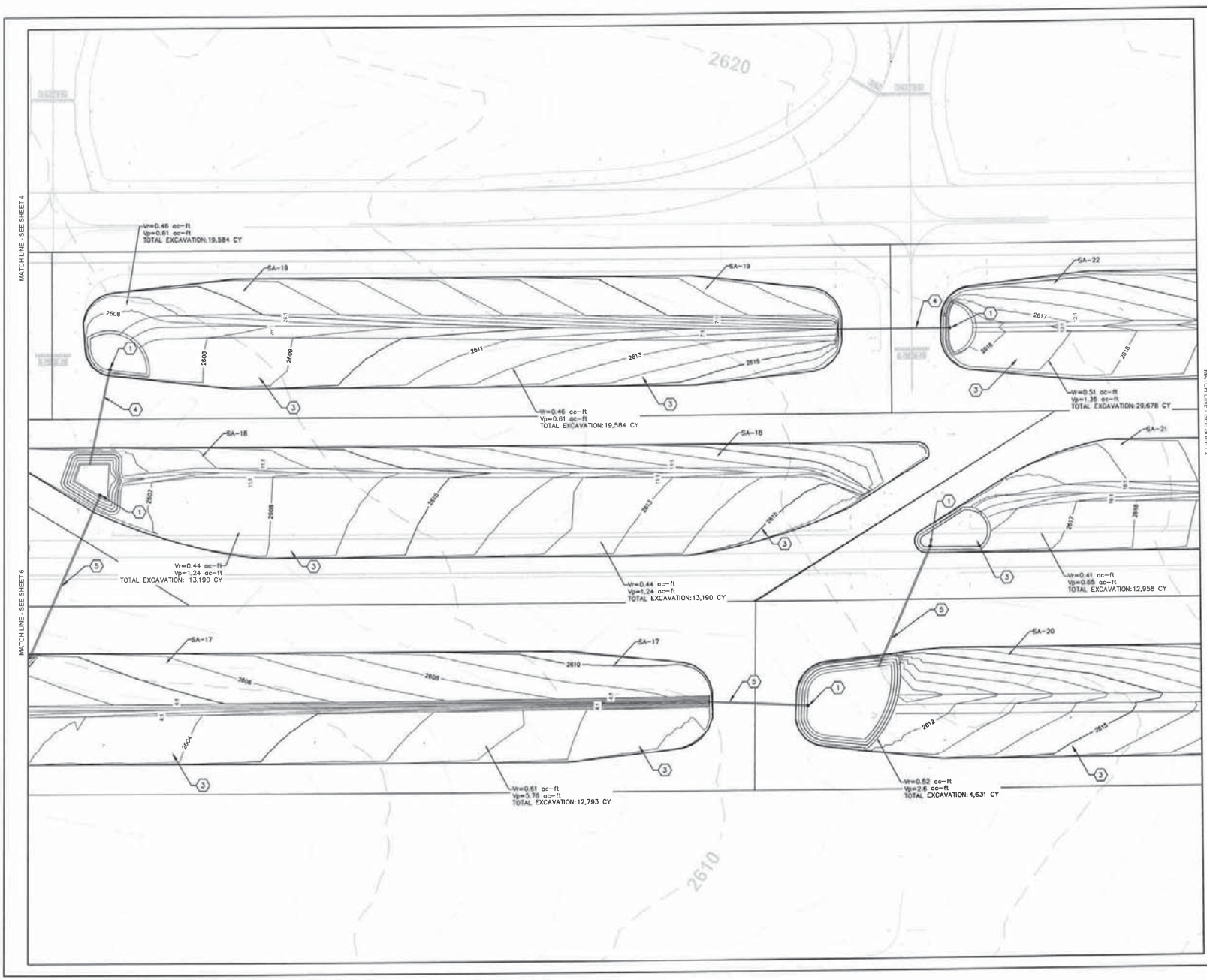
TAA PROJ.#
10112255 EIS

DESIGNED BY: CGC
DRAWN BY: CGC
CHECKED BY: LAV
DATE: 1-26-2018
SCALE: AS INDICATED

SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:

SHEET 2 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	4 EA
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	446 LF
5	FURNISH AND INSTALL 30" CLASS V RGRCP	205 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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SCALE IN FEET

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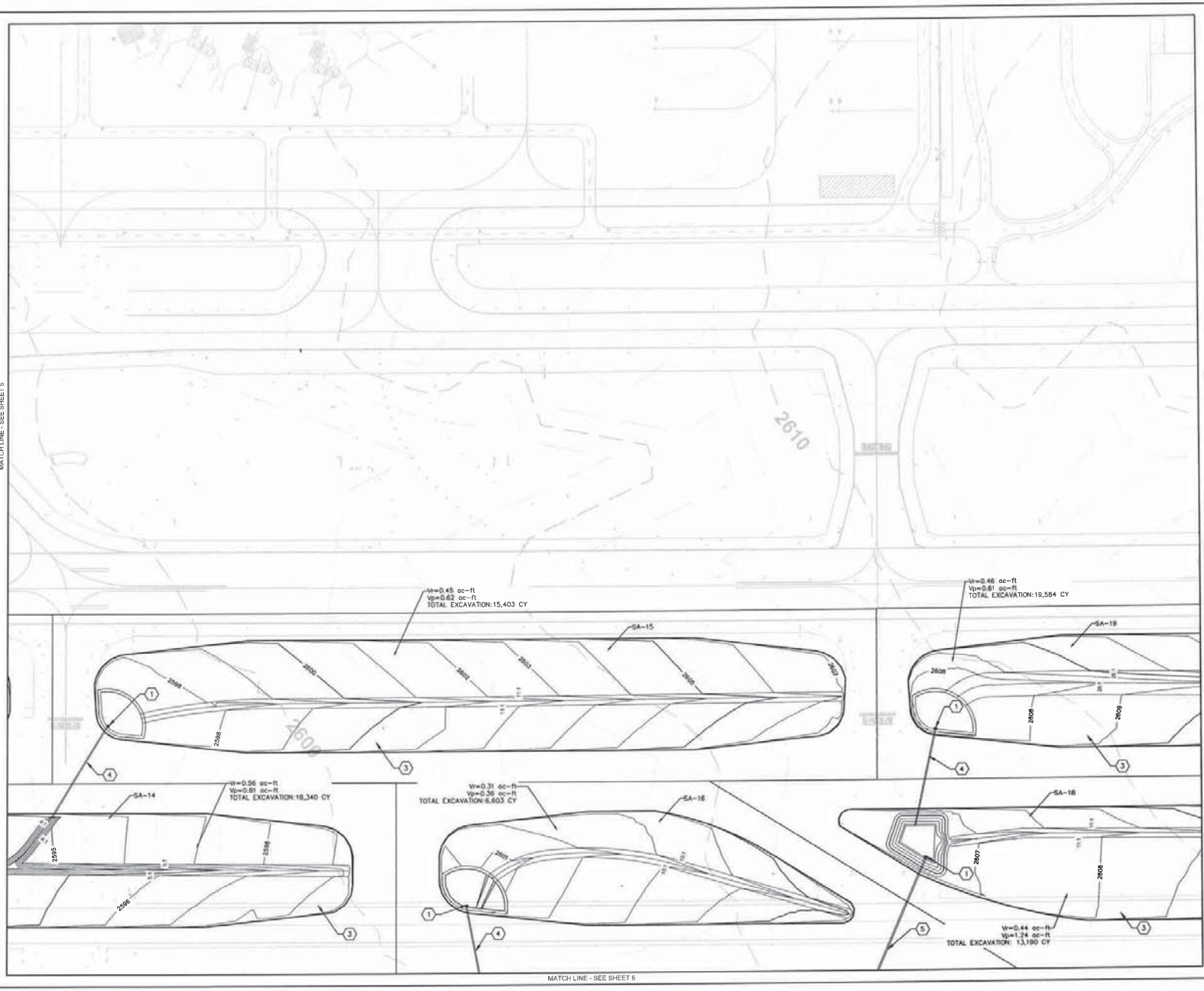
TUCSON AIRPORT AUTHORITY
TUCSON INTERNATIONAL AIRPORT RYAN AIRFIELD
TUS EIS PHASE II - 25% AIRFIELD DESIGN

DESIGNED BY: CGC
DRAWN BY: CGC
CHECKED BY: LAV
DATE: 1-26-2016
SCALE: AS INDICATED
TAA PROJ.# 10112255 EIS

SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:
SHEET 3 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	4 EA
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	417 LF
5	FURNISH AND INSTALL 30" CLASS V RGRCP	256 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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TUS EIS PHASE II - 25% AIRFIELD DESIGN

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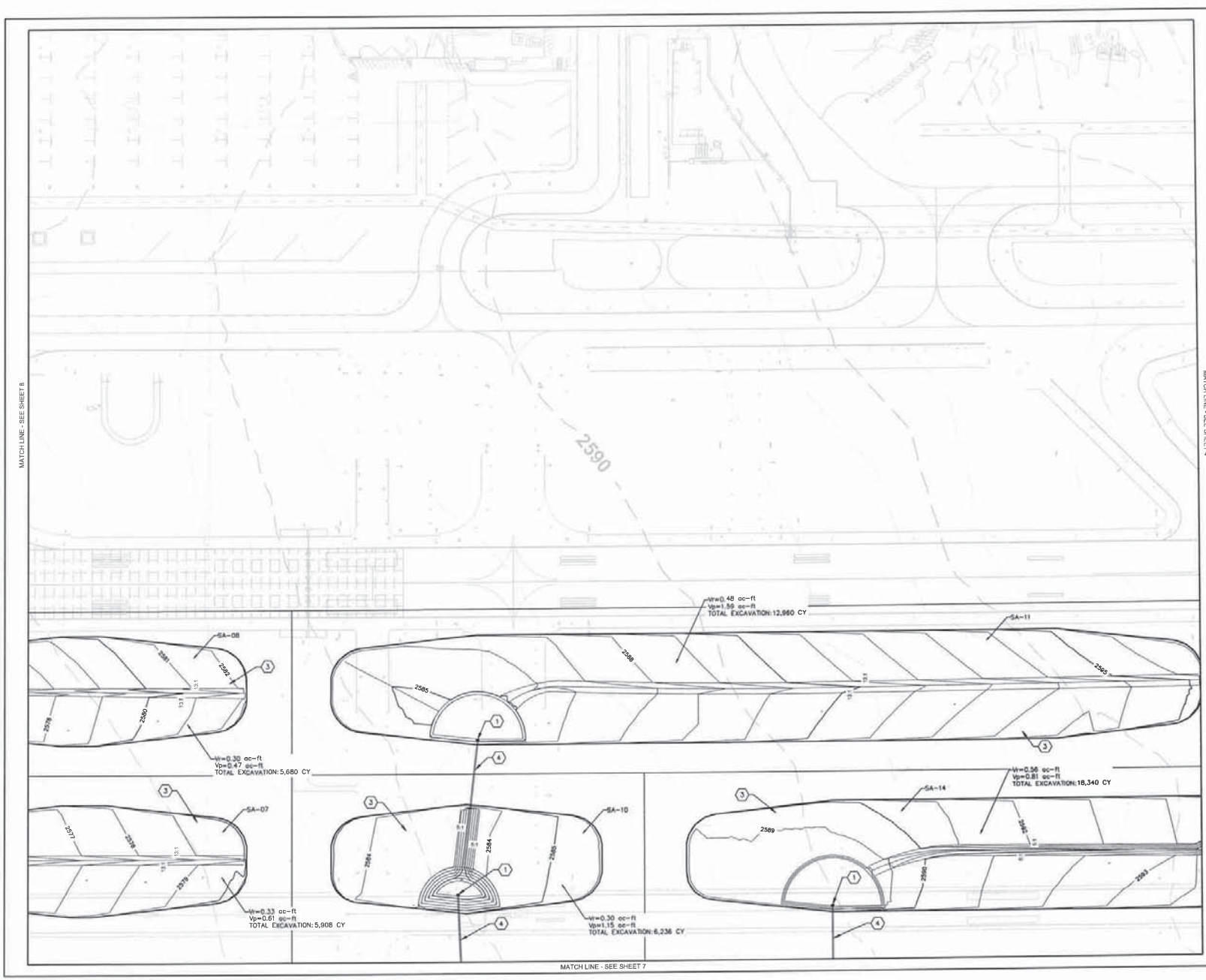
TAA PROJ.# 10112255 EIS

SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:

SHEET 4 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	3 EA
2	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	390 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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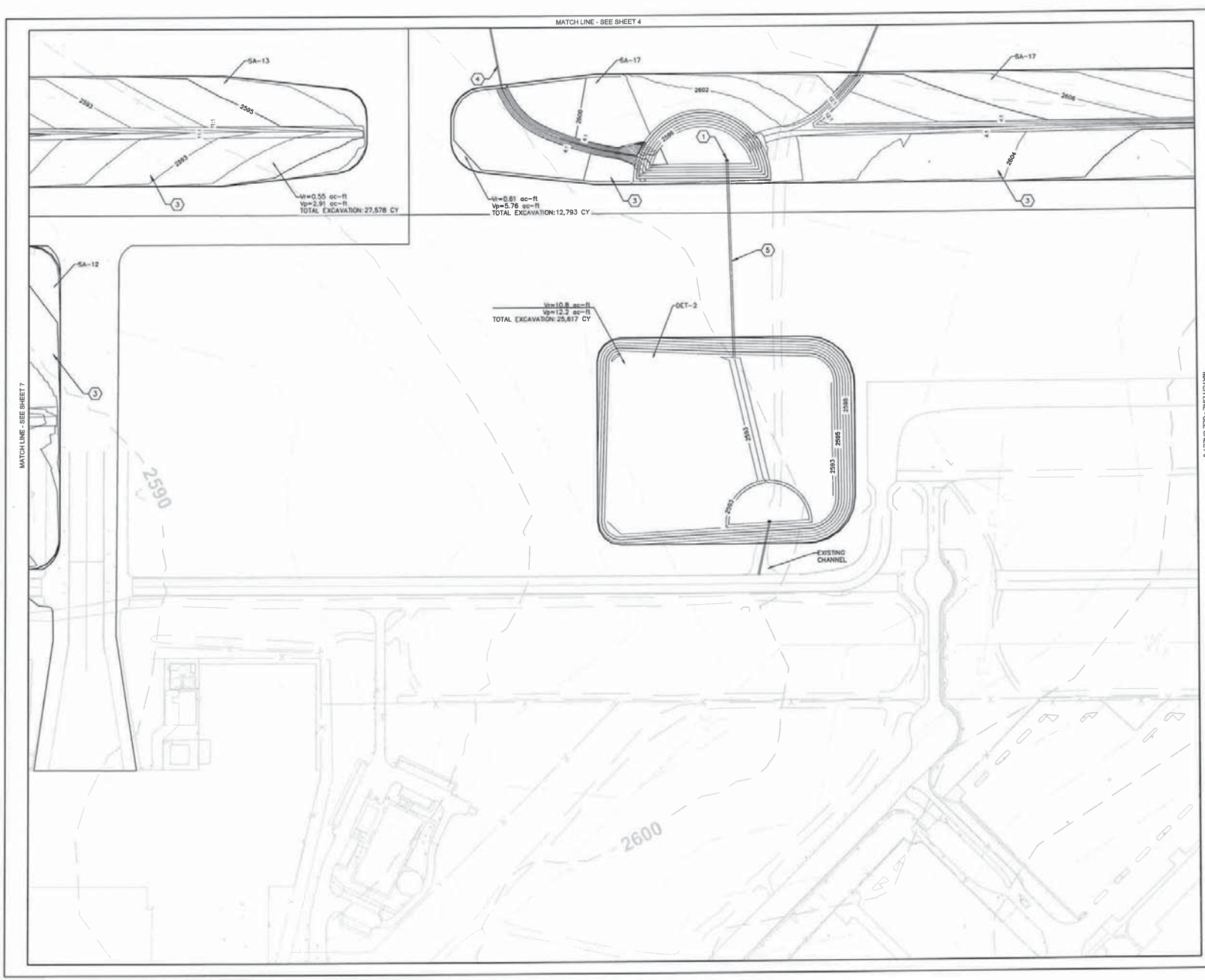
SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:

SHEET 5 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	1 EA
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	133 LF
5	FURNISH AND INSTALL 30" CLASS V RGRCP	420 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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TUS EIS PHASE II - 25% AIRFIELD DESIGN

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CHECKED BY: LAV
DATE: 1-25-2018
SCALE: AS INDICATED
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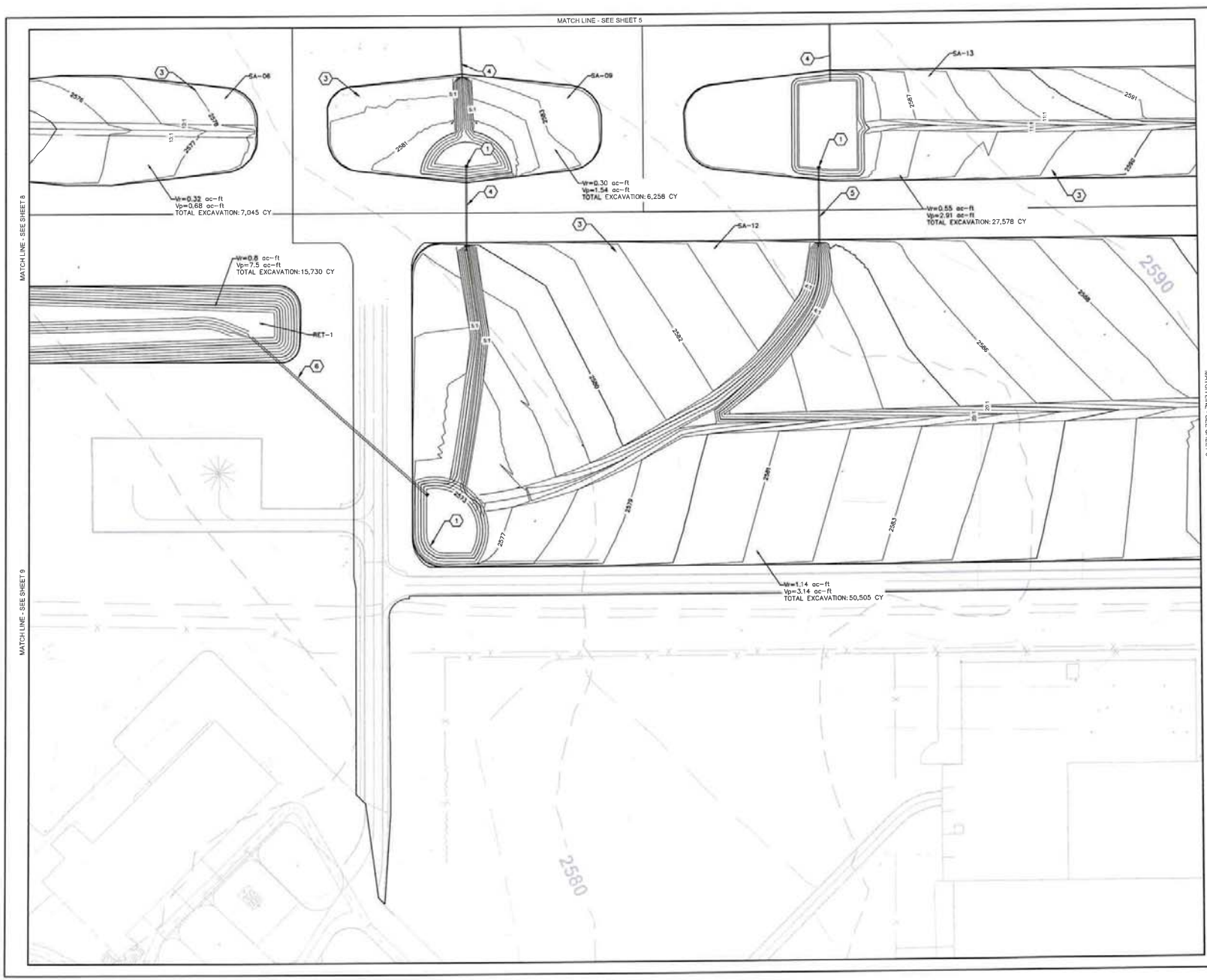
SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:
SHEET 6 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	3 EA
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	407 LF
5	FURNISH AND INSTALL 30" CLASS V RGRCP	156 LF
6	FURNISH AND INSTALL 42" CLASS V RGRCP	620 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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TUS EIS PHASE II - 25% AIRFIELD DESIGN

DESIGNED BY: CGC
DRAWN BY: CGC
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DATE: 1-26-2016
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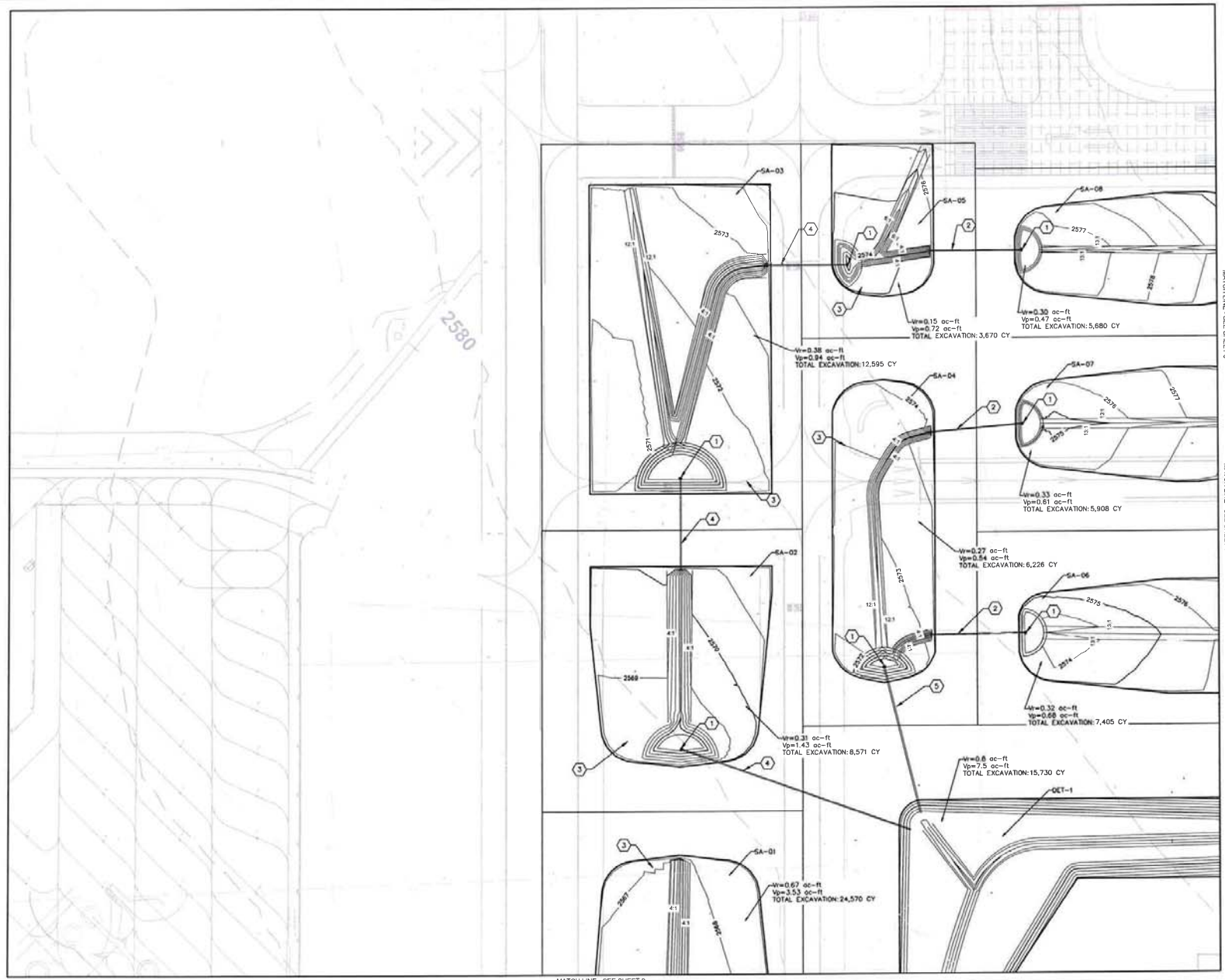
SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:
SHEET 7 OF 9



DRAINAGE CONST. NOTES

1	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	7 EA
2	FURNISH AND INSTALL 18" CLASS V RGRCP	559 LF
3	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
4	FURNISH AND INSTALL 24" CLASS V RGRCP	572 LF

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TUS EIS PHASE II - 25% AIRFIELD DESIGN

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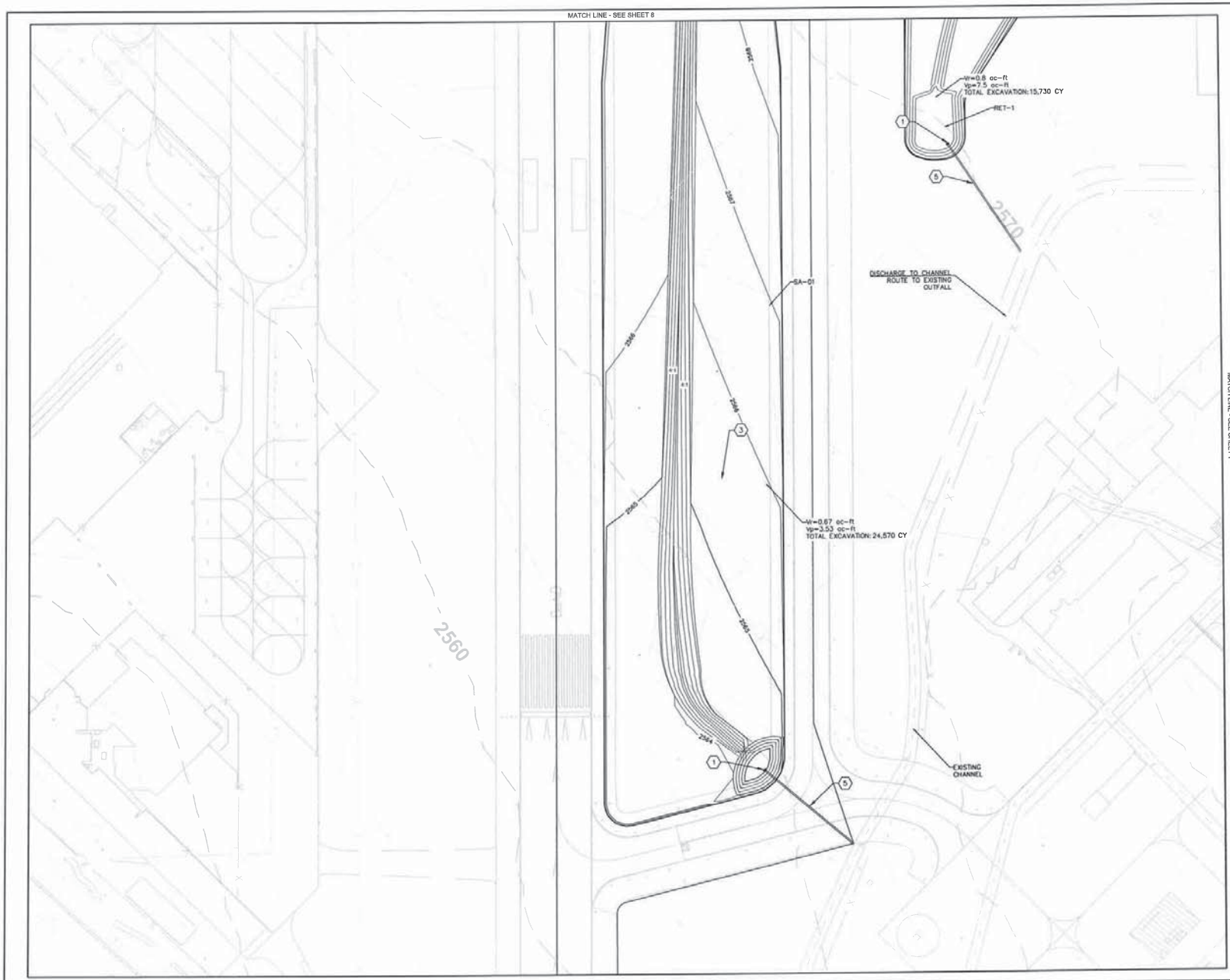
SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:
SHEET 8 OF 9



DRAINAGE CONST. NOTES

(1)	CONSTRUCT CATCH BASIN PER MAG STD DETAIL 537, TYPE G - DOUBLE	1 EA
(3)	DRAINAGE EXCAVATION	SEE CALLOUTS IN SHEETS FOR QUANTITIES
(5)	FURNISH AND INSTALL 30" CLASS V RGRCP	244 LF

*NOTE: STORAGE AREA (SA) SIDE SLOPES ARE TYPICALLY GRADED AT 6:1. IF DITCH OR OTHER GRADING FEATURES DIFFER (EXCLUDING LONGITUDINAL GRADING) A NOTE WILL BE PROVIDED ON THE SHEET.

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TUS EIS PHASE II - 25% AIRFIELD DESIGN

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SHEET OVERVIEW TITLE

SHEET REFERENCE NUMBER:
SHEET 9 OF 9