

**RESOLUTION TAILINGS STORAGE FACILITY ALTERNATIVES:
COMPARATIVE ANALYSIS OF ORDINARY HIGH WATER MARK, AQUATIC
FEATURES, AND POTENTIAL WATERS OF THE U.S.**

Prepared for: Resolution Copper

Prepared by: WestLand Resources, Inc.

Date: September 6, 2018

Project No.: 0807.149 06

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I. INTRODUCTION AND BACKGROUND

The United States Forest Service, Tonto National Forest (TNF) is analyzing alternatives for a tailings storage facility (TSF) as part of the comprehensive review under the National Environmental Policy Act (NEPA) and preparation of an Environmental Impact Statement (EIS) for the Resolution Mine plan of operations and land exchange (the Project). Five TSF alternatives are currently under analysis (Alternatives 2 through 6; **Figure 1**). Alternatives 2, 3, and 4 are located primarily on lands managed by the U.S. Forest Service, Alternative 5 is located primarily on lands administered by the ASLD and Bureau of Land Management (BLM), and Alternative 6 is located primarily on privately-owned lands and lands administered by the Arizona State Land Department (ASLD).

This memorandum has been prepared to document the extent of ordinary high water mark (OHWM), aquatic features (seeps and springs), and *potential* WOTUS for comparative analysis between the five TSF alternative footprints. This analysis focuses specifically on the ephemeral wash systems within each of the alternative footprints, based largely on a desktop review of high quality, recent aerial photographs (with the exception of Alternatives 2 and 3 for which a formal AJD was completed [SPL-2014-00064-MWL]). Aquatic features such as seeps and springs within the TSF footprint has also been included for comparative purposes.

2. METHODS

The focus of this analysis was the preliminary identification and mapping of the OHWM in surface water features within the TSF footprints.¹ The extent of the OHWM in the surface water features for Alternatives 4, 5, and 6 was delineated in ArcGIS using publicly available aerial photography² and U.S. Geological Survey (USGS) topographical maps. Additionally, based on information provided in Montgomery & Associates 2017, 2018a, 2018b, and 2018c, seeps and springs within each TSF footprint was also included for comparison.

WestLand Resources, Inc. (WestLand), then compared the impacts associated with the five alternatives, based on overall surface disturbances and the presence and quantity of potential WOTUS.

¹ In potentially jurisdictional non-wetland WOTUS, Corps regulations establish the lateral extent of federal jurisdiction using the OHWM. The OHWM is defined at 33 CFR Part 328.3(e) as “that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.”

² Although no field verification of the delineation was conducted and the final determination of the linear and lateral extent of WOTUS would be the decision of the Corps, the quality of the aerial photography used in this analysis is such that WestLand is relatively confident in the delineations of the OHWM.

3. RESULTS

The extent of potential WOTUS within the alternatives is presented in **Figures 2 through 6**. The estimated impacts to potential WOTUS within each of the TSF footprints is provided in **Table 1**. Indirect impacts, considered by the Corps from the ‘dewatering’ of downgradient reaches through upgradient fills, have not been estimated. Indirect impacts are generally considered to extend from the point of fill down to the confluence with the next substantial drainage.

Table 1. Comparison of Surface Disturbance, Impacts to OHWM, Seeps and Springs, and Potential WOTUS between Alternatives

Alternative	Surface Disturbance (ac)	Area of Mapped OHWM (ac)	Linear Mapped OHWM (ft)	Impacts to Potential WOTUS (ac)¹	Seeps and Springs within the TSF Footprint
Alternative 2	3309	34.7	121,594	0.0	3
Alternative 3	3308	35.8	125,444	0.0	3
Alternative 4	2266	48.9	237,351	0.0	2
Alternative 5	5889	182.5	759,064	182.5	0
Alternative 6	4002	120.0	395,215	120.0	0

¹ Alternative 4, 5, and 6 have not been evaluated for the potential presence of special aquatic sites (i.e., wetlands). The Corps has determined there are no WOTUS, including special aquatic sites, at Alternatives 2 and 3 (Near West Analysis Area). Because Alternative 4 is upgradient of the Near West Analysis Area, no WOTUS are anticipated at Alternative 4.

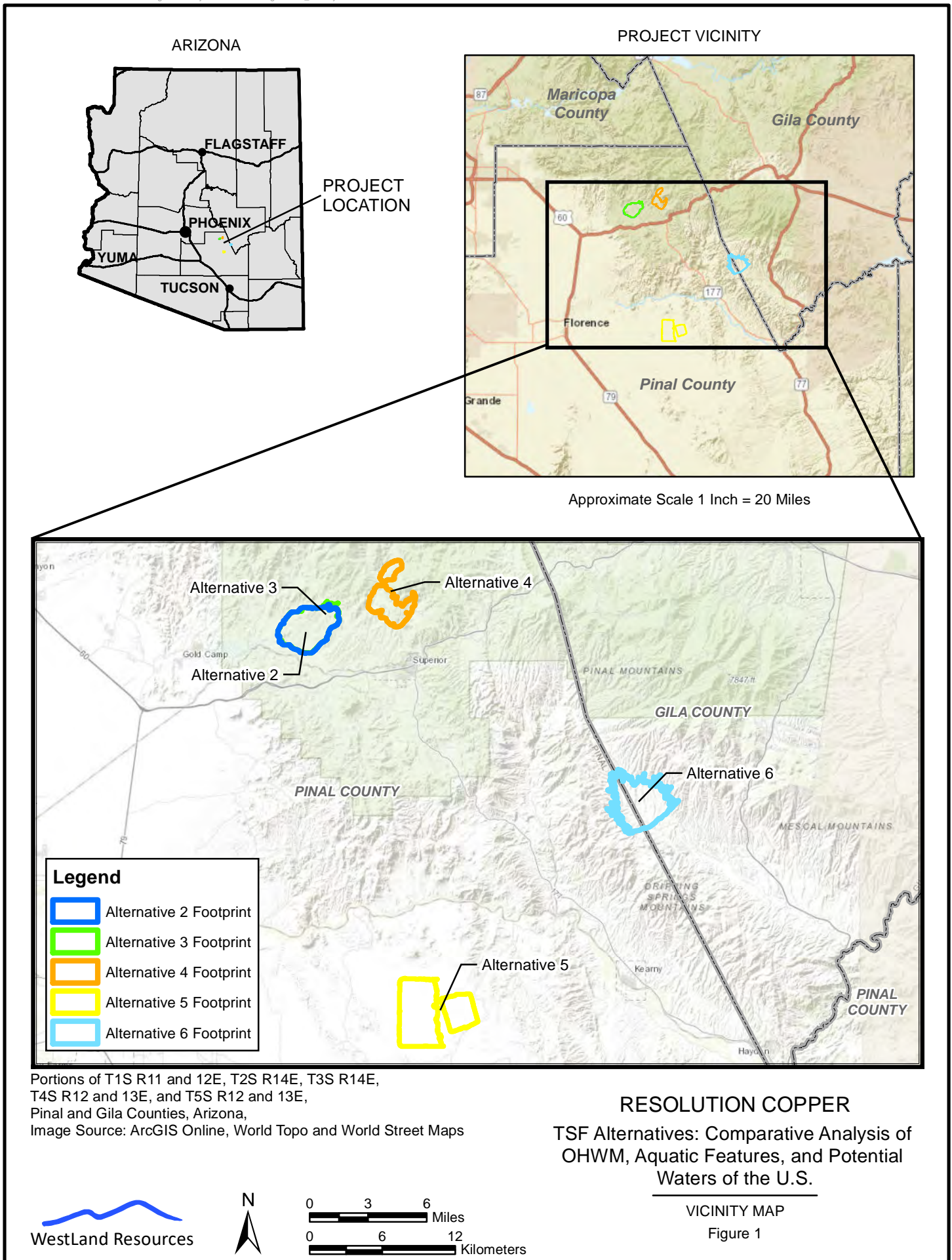
4. DISCUSSION

This analysis provides a preliminary, comparative analysis of OHWM, seeps and springs, and potential WOTUS for all five TSF alternative sites.

5. REFERENCES

- Montgomery & Associates. 2017. Conceptual Hydrogeologic Model for Proposed Near West Tailings Storage Facility, Resolution Copper Mining LLC, Pinal County, Arizona: Final report prepared for Resolution Copper Mining LLC, November 25, 2017.
- _____. 2018a. Peg Leg Investigations, Results of Site Reconnaissance: Report prepared for Resolution Copper Mining, May 7, 2018.
- _____. 2018b. Silver King Investigations, Results of Site Reconnaissance: Report prepared for Resolution Copper Mining, May 9, 2018.
- _____. 2018c. Skunk Camp Investigations, Results of Site Reconnaissance: Technical Memorandum prepared for Resolution Copper Mining LLC, July 20, 2018.



FIGURES



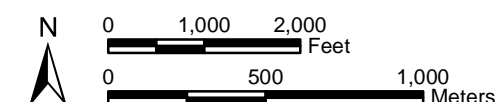


T1S, R11E, Portions of Sections 22-27, 34-36,
T1S, R12E, Portions of Sections 19, 30, and 31,
Pinal County, Arizona,
Image Source: 2017 USDA NAIP Orthophoto

Legend

-  Alternative 2 Impacted
Ordinary High Water Mark
-  Alternative 2 Footprint

An Approved Jurisdictional Determination (AJD) request for the Near West Analysis Area was submitted to the U.S. Army Corps of Engineers (Corps), and the Corps determined that there are no Waters of the United States at this site (SPL-2014-00064-MWL). This AJD expires on March 6, 2020. Alternative 2 is located within the Near West Analysis Area.




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ALTERNATIVE 2
Figure 2



T1S, R11E, Portions of Sections 23-27, 34-36,
T1S, R12E, Portions of Sections 18, 19, 30, and 31,
Pinal County, Arizona,
Image Source: 2017 USDA NAIP Orthophoto

Legend

-  Alternative 3 Impacted Ordinary High Water Mark
-  Alternative 3 Footprint

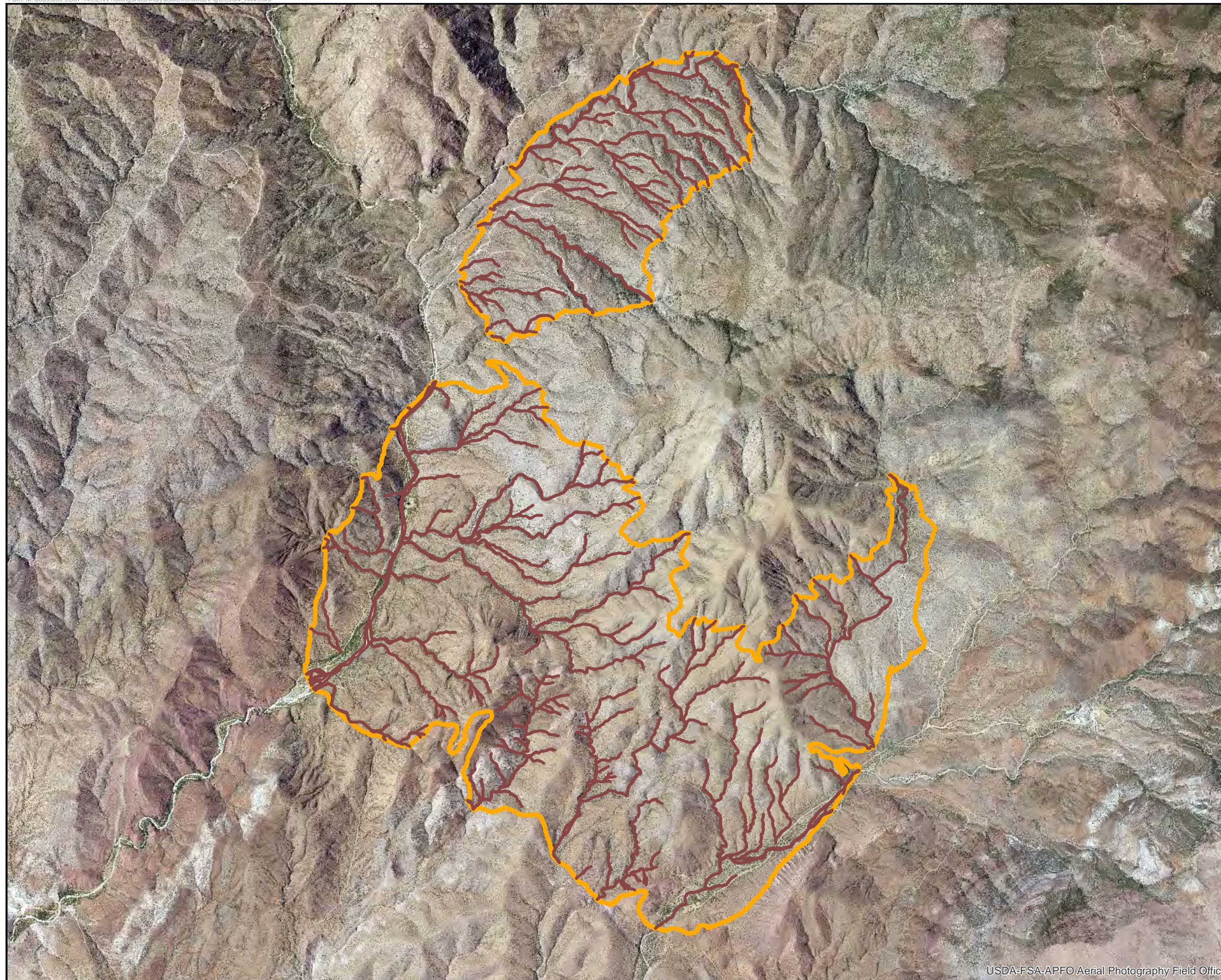
An Approved Jurisdictional Determination (AJD) request for the Near West Analysis Area was submitted to the U.S. Army Corps of Engineers (Corps), and the Corps determined that there are no Waters of the United States at this site (SPL-2014-00064-MWL). This AJD expires on March 6, 2020. Alternative 3 is located within the Near West Analysis Area.




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ALTERNATIVE 3
Figure 3

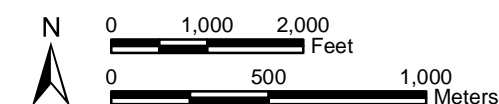


T1S, R12E, Portions of Sections 2, 3, 9-11, 14-16,
21-23, 26, and 27,
Pinal County, Arizona,
Image Source: 2017 USDA NAIP Orthophoto

Legend

-  Alternative 4 Impacted
Potential Waters
-  Alternative 4 Footprint

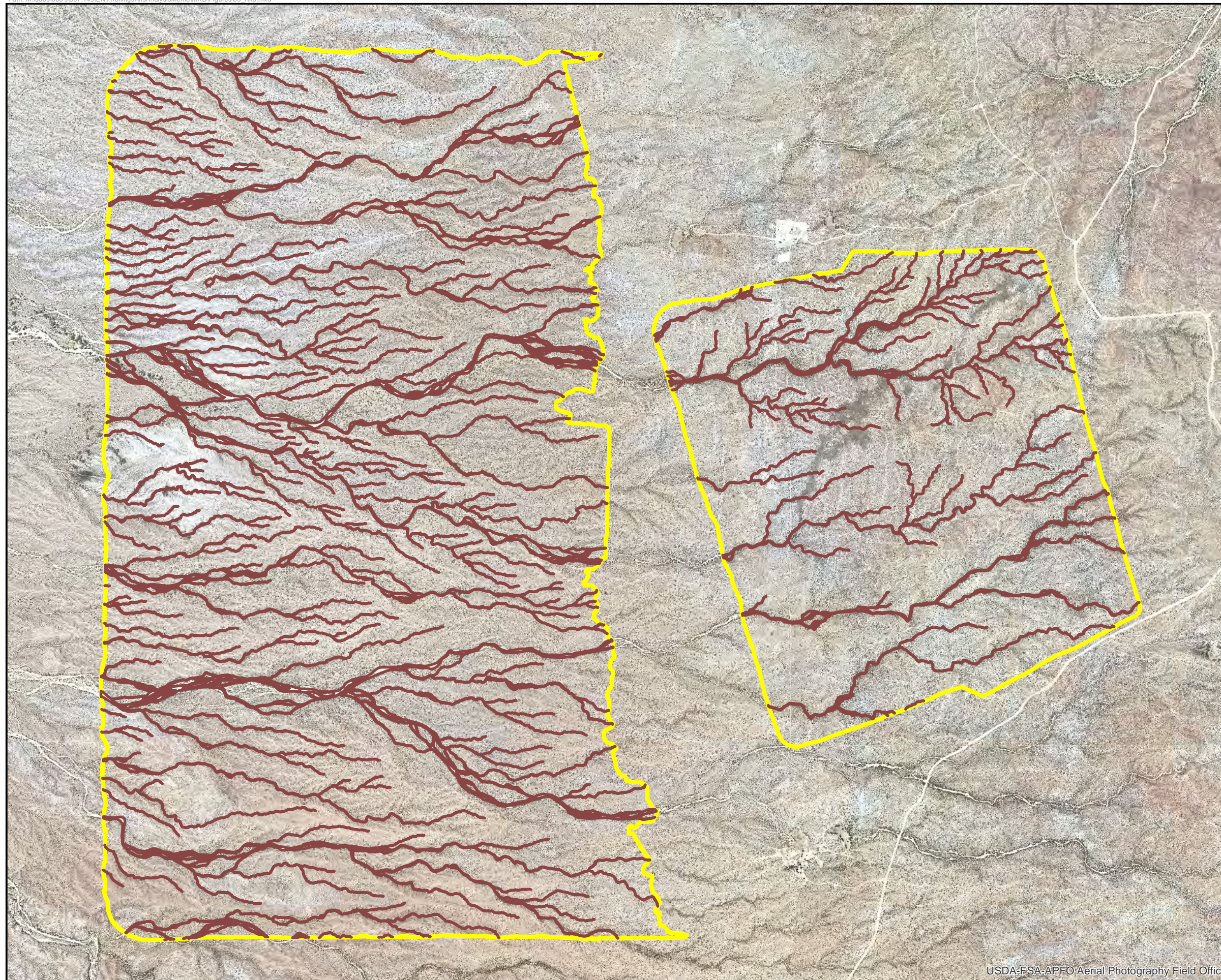
An Approved Jurisdictional Determination (AJD) request for the Near West Analysis Area was submitted to the U.S. Army Corps of Engineers (Corps), and the Corps determined that there are no Waters of the United States at this site (SPL-2014-00064-MWL). This AJD expires on March 6, 2020. Alternative 4 is located upgradient from the Near West Analysis Area so the washes within the Alternative 4 footprint are likely not currently considered WOTUS, though a formal determination has not been made.




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TSF Alternatives: Comparative Analysis of
OHWM, Aquatic Features, and Potential
Waters of the U.S.

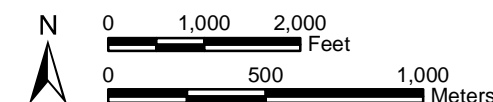
ALTERNATIVE 4
Figure 4



T4S, R12E, Portions of Sections 25-27, 34-36,
T4S, R13E, Portions of Sections 31 and 32,
T5S, R12E, Portions of Sections 1-3, 10-12,
T5S, R13E, Portions of Sections 5-7,
Pinal County, Arizona,
Image Source: 2017 USDA NAIP Orthophoto

Legend

-  Alternative 5 Impacted Potential Waters
-  Alternative 5 Footprint





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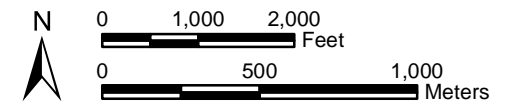
TSF Alternatives: Comparative Analysis of
OHWM, Aquatic Features, and Potential
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ALTERNATIVE 5
Figure 5

T2S, R14E, Portions of Sections 33-35,
T3S, R14E, Portions of Sections 1-4, 9-12, and 14-16,
Pinal and Gila Counties, Arizona,
Image Source: 2017 USDA NAIP Orthophoto

Legend

-  Alternative 6 Impacted Potential Waters
-  Alternative 6 Footprint




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ALTERNATIVE 6
Figure 6

Victoria Boyne

From: ResolutionProjectRecord
Subject: FW: TSF Alternatives - Aquatic Features
Attachments: TSF Potential WOTUS Analysis.pdf

From: Peacey, Victoria (RC) <Victoria.Peacey@riotinto.com>
Sent: Friday, September 7, 2018 7:37 AM
To: mcrasmussen@fs.fed.us
Cc: Donna Morey <dmorey@swca.com>; Chris Garrett <cgarrett@swca.com>; Charles Coyle <ccoyle@swca.com>
Subject: TSF Alternatives - Aquatic Features

Hi Mary,

As a follow-up to the meeting with the US Army Corps of Engineers, please see the attached for your review and consideration.

Thanks,

Vicky Peacey
Senior Manager – Permitting and Approvals



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