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INVASIVE CULTURAL RESOURCES DAMAGE ASSESSMENT TECHNICAL REPORT FOR [REDACTED] [REDACTED], MESA, MARICOPA COUNTY, ARIZONA

**Docket No. FD 36501 – Union Pacific Railroad Company
Construction and Operation Exemption – In Maricopa County, Ariz.**



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Prepared for: Surface Transportation Board, Office of Environmental Analysis
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Table of Contents

Acronyms and Abbreviations	iv
State Historic Preservation Office Report Abstract.....	v
1. Introduction.....	1
1.1 Project Background.....	1
1.2 Regulatory Context.....	2
1.2.1 Section 110(k) of the National Historic Preservation Act.....	2
1.2.2 Arizona State Regulation	3
1.2.3 Government-to-Government Tribal Consultation.....	3
2. Damage Area Definition and Summary.....	4
2.1 Damage Area Locations and Summary	4
2.1.1 Damage Area Locations	4
3. Goals and Relevant Damage Assessment Themes and Questions.....	6
3.1 Invasive Damage Assessment Goals	6
3.2 Damage Assessment Themes and Questions.....	6
3.2.1 Chronology.....	6
3.2.2 Site Function	7
3.2.3 Exchange and Interaction.....	7
4. Geomorphological Context	8
4.1 Setting.....	8
4.2 Geology and Soils.....	8
5. Damage Area 1 Invasive Damage Assessment Field Work Summary.....	10
5.1 Geomorphological Assessment.....	10
5.1.1 Geomorphological Recording Standards	10
5.1.2 Backhoe Trenching and Profiling Methods	11
5.1.3 Sample Basin Facing and Profiling Methods.....	12
5.1.4 Geomorphological Summary	13
5.1.5 Geomorphological Correlation and Summary	16
5.2 Sample Screening of [REDACTED]	17
5.2.1 Field Methods.....	17
5.3 In-field Artifact Analysis	19
6. Damage Area 2 Invasive Damage Assessment Fieldwork Summary.....	25
6.1 Geomorphological Assessment.....	25
6.1.1 Geomorphological Recording Standards	25
6.1.2 Backhoe Trenching and Profiling Methods	26
6.1.3 [REDACTED] and Profiling Methods.....	27
6.1.4 Geomorphological Summary	28

6.1.5	Geomorphological Correlation and Summary	31
6.2	In-field Artifact Analysis	31
7.	Cultural Resources Monitoring of Vegetation Stockpile Removal in Damage Area 5...	32
7.1	Field Methods	32
7.2	In-field Artifact Analysis	32
7.3	Disposition of Vegetation	33
8.	Research Questions Addressed.....	34
8.1	Chronology	34
8.2	Site Function	34
8.3	Trade and Exchange.....	35
9.	Agreements and Curation	36
9.1	██████████ Agreement	36
9.2	Curation	36
10.	Reporting	37
11.	Ongoing Consultation.....	38
12.	Summary and Recommendations.....	39
13.	References	41

Figures





Tables

Table 1. Invasive damage assessment and cultural resources invasive damage assessment fieldwork at Damage Areas 1, 2, and 5	4
Table 2. Geomorphological Trench Summary and Associated Trench Profiles	12
Table 3. Trench and [REDACTED] Sidewall Profile Summary	13
Table 4. [REDACTED] Trench Summary	18
Table 5. Summary of Disturbance Items	20
Table 6. Summary of In-field Artifact Analysis	22
Table 7. Geomorphological Trench Summary and Associated Trench Profiles	27
Table 8. Trench and [REDACTED] Sidewall Profile Summary	28

Appendices

Appendix A. Cultural Resources Map

Appendix B. Civil Survey of [REDACTED]

Acronyms and Abbreviations

AD	anno Domini
APE	area of potential effects
ARS	Arizona Revised Statutes
ASM	Arizona State Museum
bgs	below ground surface
Board	Surface Transportation Board
CFR	Code of Federal Regulations
cm	centimeter(s)
ft	foot (feet)
Gm	Gilman loam
GSRB&M	Gila and Salt River Baseline and Meridian
Jacobs	Jacobs Engineering Group Inc.
ka	kilo annum
m	meter(s)
No.	number
OEA	Office of Environmental Analysis
Phoenix Subdivision	Phoenix Subdivision main line
PIRATE	Pecos Industrial Rail Access and Train Extension
Qm	Late and Middle Pleistocene surficial deposits
Qmlf	fine-grained relict alluvial fan and terrace deposits of late to middle Pleistocene
QTs	Quaternary (Pleistocene) sand, gravel, and conglomerate
Qy	Holocene surficial deposits
R7E	Range 7 East
ROW	right-of-way
T2S	Township 2 South
UP	Union Pacific Railroad Company

State Historic Preservation Office Report Abstract

Report Title: Invasive Cultural Resources Damage Assessment Technical Report for
[REDACTED] Mesa, Maricopa County, Arizona

Project Name: Pecos Industrial Rail Access and Train Extension (PIRATE)

Project Location: Mesa, Maricopa County, Arizona

Project Locator Universal Transverse Mercator: [REDACTED]
[REDACTED]

Project Sponsor: Union Pacific Railroad Company (UP)

Sponsor Project Number(s): Docket No. FD 36501

Lead Agency: Surface Transportation Board (Board)

Other Involved Agencies: Arizona Department of Environmental Quality, Arizona State Land Department, Arizona State Museum (ASM), City of Mesa, Flood Control District of Maricopa County, Phoenix-Mesa Gateway Airport, Town of Queen Creek, Maricopa County, State Historic Preservation Office, Salt River Project, U.S. Army Corps of Engineers

Applicable Regulations: Section 110(k) of the National Historic Preservation Act of 1966, as amended (54 *United States Code* § 306108, implementing regulations at 36 *Code of Federal Regulations* Part 800.9); *Arizona Revised Statutes* § 41-865

Funding Source: Private

Arizona State Land Department Right-of-Way Application Number:
[REDACTED]

Arizona State Museum Accession Number: 2024-0051

Description of the Project/Undertaking: UP is seeking authority from the Board to construct and operate approximately 6.0 miles of new rail line in Maricopa County, Arizona (Docket No. FD 36501). The proposed rail line would connect UP's existing Phoenix Subdivision main line (Phoenix Subdivision) to industrial properties [REDACTED] via a single-track rail line. UP also proposes to construct and operate approximately 2.5 miles of planned ancillary support tracks along the Phoenix Subdivision between Power Road and Ellsworth Road. This project is referred to as PIRATE.

On behalf of the Board's Office of Environmental Analysis (OEA), Jacobs Engineering Group Inc., OEA's third-party contractor, conducted a Class III cultural resources survey of the project's area of potential effects (APE) (Rainey and Stubing 2022). The Class III survey identified 4 previously recorded cultural resources sites [REDACTED]

2 in-use historic structures, and 53 isolated occurrences and isolated features within the APE.

The four cultural resources sites were determined eligible for inclusion on the National Register of Historic Places. The four cultural resources sites would not be avoided by construction activities. As a result, OEA determined that a finding of “adverse effects to historic properties” is appropriate for the project and initiated the preparation of a Memorandum of Agreement to mitigate the adverse effects.

Prior to execution of the Memorandum of Agreement and issuance of a Final EA completing the environmental and historic review, significant ground disturbance within the APE was observed. OEA promptly contacted UP requesting immediate action be taken to prevent any further disturbance. OEA also apprised the consulting parties of the situation. Impacts to archaeological sites in the PIRATE APE were identified in five damage areas and the extent and magnitude of the damage was detailed in a noninvasive damage assessment report (Powell 2024).

As defined by Powell (2024), the magnitude of damage observed was quantified using the following classification scale:

- **Major Damage.** Damage was classified as major if the surface disturbance was greater than or equal to 2 feet (ft) deep (60.96 centimeters [cm]) or regardless of depth.
- **Moderate Damage.** Damage was classified as moderate if the surface disturbance was less than 1 ft deep (30.48 cm) and intersected any previously recorded artifact concentrations or features, or if the surface disturbance was between 1 and 2 ft deep (30.48–60.96 cm).
- **Minor Damage.** Damage was classified as minor if the surface disturbance was less than 1 ft deep (30.48 cm) and did not intersect any previously recorded artifact concentrations or features.

Based on the information presented in Powell (2024), OEA recommended an invasive (ground-disturbing) damage assessment in Damage Areas 1 and 2, as well as cultural resources monitoring for the removal of vegetation stockpiles in Damage Area 5. An invasive damage assessment work plan was prepared to guide the investigations (Luhnow and Powell 2024).

As documented by Powell (2024), damage observed in Damage Area 3 was classified as minor, and damage observed in Damage Area 4 was classified as moderate. Given that the damage was largely surficial, and that intact subsurface deposits may exist in these two Damage Areas, no invasive damage assessment was recommended for these two areas.

The invasive damage assessment fieldwork was conducted between August 5 and September 27, 2024. Glennda Luhnow, M.A., RPA served as the principal investigator for the invasive damage assessment fieldwork. Walter R. Punzmann, M.A., served as the project field director, and Matthew Steinkamp, M.A., RPA served as the project geomorphologist. The work was supported by Jacobs’ archaeologists Megan Adams, Logan Gautier, Jenna Kent, Oliver Klush, Hannah Lasser, Melia LeDoux, Glennda Luhnow, Daniel MacDonald, Caleb Nicholson, and Pamela Rainey.

This report presents the results of the invasive damage assessment fieldwork.

Description of Damage Areas: Invasive damage assessment fieldwork was conducted at three damage areas discussed herein. The damage areas are located within the PIRATE APE [REDACTED]

- **Damage Area 1.** Damage Area 1 is located in the [REDACTED]
[REDACTED] This damage area is within the boundaries of [REDACTED] in the UP right-of-way (ROW).
- **Damage Area 2.** Damage Area 2 [REDACTED] This damage area is partially located within the boundaries of [REDACTED] in the UP ROW.
- **Damage Area 5.** [REDACTED] This damage area is located within the boundaries of [REDACTED] in the UP ROW.

Consultant Firm/Organization: Jacobs Engineering Group Inc.

Consultant Project Number: UPPRCP73

Permit Number(s): N/A

Eligible Site in Damage Areas 1, 2, and 5: [REDACTED]

Comments: This report provides the results of invasive damage assessment fieldwork conducted within three damage areas for the PIRATE project. The fieldwork was guided by an approved invasive damage assessment work plan (Luhnow and Powell 2024). Three activities occurred during the fieldwork in Damage Areas 1, 2, and 5 within [REDACTED]

- Geomorphological trenching and profiling to assess the remaining archaeological potential in [REDACTED] in Damage Areas 1 and 2.
- Sample screening of a [REDACTED] in Damage Area 1 to assess whether [REDACTED] and to inform on the ultimate origin of the stockpile materials.
- Monitoring the removal of vegetation stockpiles in Damage Area 5 from the surface of the site.

Geomorphological investigations in Damage Areas 1 and 2 consisted of the profiling of three mechanically excavated trenches in [REDACTED] to determine the stratigraphic sequence relative to previously recorded cultural horizons (Greenwald et al. 1994; Hackbarth and Craig 2004; Hart and Craig 2003, 2006; Phillips 2000). The result of the geomorphological assessment indicates that within the [REDACTED]

in Damage Areas 1 and 2, the construction and excavation activities have removed scientifically important paleosols (buried A Horizons) associated with local occupations of the area. Within Damage Area 1, the construction and excavation activities also removed known archaeological features identified by Hackbarth and Craig (2004). Based on the geomorphological assessment, there is no remaining archaeological potential within the Damage Area 1 and 2 [REDACTED].

Sample screening of the Damage Area 1 [REDACTED] consisted of the mechanical excavation of eight trenches within the [REDACTED]. The trenches were systematically placed across the [REDACTED] and resulted in a two percent sample of the materials. Spoils from each trench were segregated and screened through 1/4-inch mesh. A total of 78 individual precontact artifacts, consisting of ceramics, flaked stone, shell, and ground stone, were identified by the screening. Eight pieces of faunal bone and three historic artifacts were also identified. The stockpile also contained modern construction debris. [REDACTED].

The screening results indicate that the [REDACTED] consists of unconsolidated fill with a sparse count of precontact artifacts mixed with modern construction debris. Based on these results, it is likely that the [REDACTED] contains soil derived from [REDACTED] but from outside UP ROW. However, given the limited number of artifacts found during screening compared to the density of artifacts observed on the previously intact surface of the [REDACTED]. The origin of the [REDACTED] remains unknown, as does the ultimate disposition of the [REDACTED].

The removal of the vegetation stockpiles in Damage Area 5 was monitored by a qualified archaeologist. OEA made a slight change in the method for stockpile removal previously described in Luhnnow and Powell (2024). The light nature of the vegetation contained in the vegetation stockpile made it difficult to pick up using a backhoe. Alternatively, the backhoe was used to slowly push the vegetation to the [REDACTED]. From there, it was picked up by a skid steer and loaded into a trailer for removal. No additional site damage occurred as a result of this change.

Based on the results of the invasive damage assessment fieldwork, major damage occurred to [REDACTED] as a result of construction activities in Damage Areas 1 and 2. Known archaeological features and all potential culture-bearing archaeological deposits were removed in the Damage Area 1 [REDACTED] as a result of its construction. All potential culture-bearing archaeological deposits were removed in the Damage Area 2 [REDACTED] as a result of its construction. [REDACTED].

[REDACTED]. However, given that the material present is likely not derived from the Damage Area 1 [REDACTED], it cannot be definitively determined whether [REDACTED].

Based on the results of the invasive damage assessment monitoring, minor damage occurred to [REDACTED] as a result of the vegetation clearing and stockpiling in Damage Area 5.

The O’Odham community has stated that they have suffered intangible cultural damage to their heritage and traditional values as result of this ground disturbance.

1. Introduction

1.1 Project Background

Union Pacific Railroad Company (UP) is seeking authority from the Surface Transportation Board (Board) to construct and operate approximately 6.0 miles of new rail line in Maricopa County, Arizona (Docket Number [No.] FD 36501). The proposed rail line would connect UP's existing Phoenix Subdivision main line (Phoenix Subdivision) to industrial properties southeast of the [REDACTED] via a single-track rail line (Figure 1). UP also proposes to construct and operate approximately 2.5 miles of planned ancillary support track along the Phoenix Subdivision between [REDACTED]. This project is referred to as the Pecos Industrial Rail Access and Train Extension (PIRATE).

On behalf of the Board's Office of Environmental Analysis (OEA), Jacobs Engineering Group Inc. (Jacobs), OEA's third-party contractor, conducted a Class III cultural resources survey of the project's area of potential effects (APE) (Rainey and Stubing 2022). The Class III survey identified 4 previously recorded cultural resources sites [REDACTED] 2 in-use historic structures (Old Rittenhouse Road and the Mesa to Winkelman Spur of the Southern Pacific Railroad), and 53 isolated occurrences and isolated features within the APE.

The four cultural resources sites were determined eligible for inclusion on the National Register of Historic Places. The four cultural resources sites would not be avoided by construction activities. As a result, OEA determined that a finding of "adverse effects to historic properties" is appropriate for the project and initiated the preparation of a Memorandum of Agreement to mitigate the adverse effects.

Prior to execution of the Memorandum of Agreement and issuance of a Final EA completing the environmental and historic review, significant damage from construction activities was observed within the boundaries of two archaeological sites eligible for the National Register of Historic Places [REDACTED] OEA subsequently prepared a preliminary archaeological site damage summary memorandum and distributed it to the project's consulting parties on September 12, 2023. Jacobs, OEA's third-party contractor, conducted a comprehensive noninvasive damage assessment to fully delineate the extent and magnitude of the construction damage. The results are reported in Powell (2024).

As defined by Powell (2024), the magnitude of damage observed was quantified using the following classification scale:

- **Major Damage.** Damage was classified as major if the surface disturbance was greater than or equal to 2 feet (ft) deep (60.96 centimeters [cm]) or [REDACTED].
- **Moderate Damage.** Damage was classified as moderate if the surface disturbance was less than 1 ft (30.48 cm) deep and intersected any previously recorded artifact concentrations or features, or if the surface disturbance was between 1 and 2 ft deep (30.48–60.96 cm).

- **Minor Damage.** Damage was classified as minor if the surface disturbance was less than 1 ft (30.48 cm) deep and did not intersect any previously recorded artifact concentrations or features.

Based on the information presented in Powell (2024), OEA recommended invasive (ground disturbing) damage assessment in Damage Areas 1 and 2, as well as cultural resources monitoring for the removal of vegetation stockpiles in Damage Area 5. An invasive damage assessment work plan was prepared to guide the investigations (Luhnow and Powell 2024).

As documented by Powell (2024), damage observed in Damage Area 3 [REDACTED] was classified as minor, and damage observed in Damage Area 4 [REDACTED] was classified as moderate. Because the damage was largely surficial, and intact subsurface deposits may exist in these two damage areas, no invasive damage assessment was recommended for these two areas.

Figure 1. General project location.

FIGURE REDACTED

The invasive damage assessment field work took place between August 5 and September 27, 2024. Glendda Luhnow, M.A., RPA, served as the principal investigator for the work. Walter R. Punzmann, M.A., served as the project field director, and Matthew Steinkamp, M.A., RPA, served as the project geomorphologist. The work was supported by Jacobs' archaeologists Megan Adams, Logan Gautier, Jenna Kent, Oliver Klush, Hannah Lasser, Melia LeDoux, Glendda Luhnow, Daniel MacDonald, Caleb Nicholson, and Pamela Rainey. This report presents the results of the invasive damage assessment field work.

1.2 Regulatory Context

1.2.1 Section 110(k) of the National Historic Preservation Act

Section 110(k) of the National Historic Preservation Act (NHPA) involves “anticipatory demolition.” Section 110(k) states that a federal agency “will not grant a loan, loan guarantee, permit, license, or other assistance to an applicant who, with intent to avoid the requirements of Section 106, has intentionally significantly adversely affected a historic property to which the grant would relate or having legal power to prevent it has allowed the significant adverse effect to occur, unless the agency, after consultation with the [Advisory] Council [on Historic Preservation], determines that circumstances justify granting the assistance despite the adverse effect created or permitted by the applicant” (54 *United States Code* § 306108, implementing regulations at 36 *Code of Federal Regulations* [CFR], Part 800.9).

Because of the ground disturbance that has taken place within the PIRATE APE, the Board is conducting a damage assessment and considering Section 110(k) of NHPA.

Following the recommendations in Powell (2024), and the methods in Luhnow and Powell (2024), invasive (ground-disturbing) damage assessment field work was performed in Damage Areas 1, 2, and 5. The purposes of the invasive damage assessment were to assist OEA to understand the nature, extent, and magnitude of the damage to archaeological sites specific to Damage Areas 1 and 2, and to conduct cultural resources monitoring of the vegetation stockpile removal in Damage Area 5.

1.2.2 Arizona State Regulation

The areas of archaeological damage are on privately owned land, and so are only subject to cultural resources compliance with *Arizona Revised Statutes* (ARS) § 41-865. ARS § 41-865 contains rules, classifications, and definitions specific to disturbing human remains and funerary objects on private land.

1.2.3 Government-to-Government Tribal Consultation

The federal government has a unique and complex relationship with Native American Tribes that has been codified in treaties, Supreme Court case law, and federal executive orders and regulations. Native American Tribes have been addressed as sovereign governments since the earliest colonial governments in American history. Government-to-government Tribal consultation is a formal, two-way, government-to-government dialogue between representatives of Native American Tribes and federal agencies whose purpose is to discuss federal actions before the federal agency makes decisions on those actions.

OEA has been conducting government-to-government Tribal consultation since the beginning of the environmental and historic review process for PIRATE in 2022, and these important efforts continue today. Government-to-government Tribal consultation can be formally initiated by OEA or a consulting Tribe. Formal consultation includes:

- Two-way dialogue behind closed doors between official representatives of Tribes and federal agencies
- Notice with sufficient detail of the topic in question being provided to tribes at least 30 days in advance
- Discussion between Tribes and appropriate senior officials of the federal agency, in person if possible
- Record of proceeding via transcript or notes
- Federal response to Tribal leaders on how the agency decision incorporated Tribal input

Government-to-government Tribal consultation is separate from the larger consulting party meetings open to Native American Tribes and all the other Section 106 consulting parties, which also continue to take place. OEA remains committed to continuing meaningful communication with all consulting parties through both formal government-to-government consultation with Native American Tribes and the larger consulting party meetings that have taken place throughout PIRATE review.

2. Damage Area Definition and Summary

2.1 Damage Area Locations and Summary

Invasive damage assessment field work took place at three damage areas discussed here.



2.1.1 Damage Area Locations

- **Damage Area 1.** Damage Area 1 [REDACTED]
[REDACTED] This damage area is within the boundaries of [REDACTED] in the UP right-of-way (ROW).
- **Damage Area 2.** Damage Area 2 [REDACTED]
[REDACTED] This damage area is partially within the boundaries of [REDACTED] in the UP ROW.
- **Damage Area 5.** Damage Area 5 [REDACTED]
[REDACTED].
This damage area is within the boundaries of [REDACTED] in the UP ROW.

Appendix A provides a map showing these locations relative to the archaeological sites. Table 1 summarizes the invasive damage assessment field work at Damage Areas 1, 2, and 5. Figures 2 and 3 provide an overview of the Damage Areas.

Table 1. Invasive damage assessment and cultural resources invasive damage assessment fieldwork at Damage Areas 1, 2, and 5

Type of Disturbance	Proposed Method
<i>Damage Area 1 /</i> [REDACTED]	
[REDACTED]	Geomorphological trenching
	Sample sidewall facing and profiling
[REDACTED]	Sample screening
<i>Damage Area 2 /</i> [REDACTED]	
[REDACTED]	Geomorphological trenching
	Sample sidewall facing and profiling
<i>Damage Area 5 /</i> [REDACTED]	
Vegetation stockpiles	Cultural resources monitoring

Figure 2. Location of the damage areas and UP ROW.

FIGURE REDACTED

Figure 3. Aerial overview of the damage areas.

FIGURE REDACTED

3. Goals and Relevant Damage Assessment Themes and Questions

This section focuses on the specific goals of the invasive (ground-disturbing) damage assessment and provides the damage assessment themes and questions discussed in the invasive damage assessment work plan (Luhnow and Powell 2024).

3.1 Invasive Damage Assessment Goals

The primary goal of the invasive damage assessment field work is to provide the Board with information about the extent and magnitude of subsurface impacts to [REDACTED]. It is important to underscore that the invasive damage assessment field work that has been completed focused on **damage assessment**, rather than **data recovery**. Therefore, the primary goals of the invasive damage assessment included:

- Assessment of the potential for intact archaeological deposits within the [REDACTED] in Damage Areas 1 and 2.
- Assessment of the presence of [REDACTED] in Damage Area 1.
- Removal of vegetation stockpiles in Damage Area 5 from the surface of [REDACTED]

In-field analysis of isolated artifacts occurred during the invasive damage assessment fieldwork. The purpose of the in-field analysis was to inform the type of archaeological data lost during the construction activities that should not have taken place before the environmental and historic review is complete and the Board has issued a decision granting or denying the construction and operation and to inform the Board's consideration of Section 110(k).

Preliminary damage assessment themes and questions were provided in Luhnow and Powell (2024). A very limited artifact assemblage was observed by the invasive damage assessment field work.

3.2 Damage Assessment Themes and Questions

3.2.1 Chronology

[REDACTED] has been preliminarily dated to the wide chronological range of the Hohokam Preclassic (anno Domini [AD] 300 to AD 1150) and Classic (AD 1150 to AD 1350) periods, based on previous research (Hart and Craig 2006). Under the theme of chronology, one primary goal is to understand what time period is represented at [REDACTED] based on analyzed artifacts.

Questions related to the theme of chronology include:

- *Are diagnostic artifacts present that may inform the theme of chronology?*
- *Are diagnostic artifacts at [REDACTED] consistent with those reported by other researchers in Damage Area 1?*

3.2.2 Site Function

This damage assessment theme focuses on the types of activities prehistoric populations conducted within these portions of site [REDACTED]. The relevance of this theme is to identify prehistoric activities that took place within the damage areas to further characterize the magnitude of the damage to the resource. Based on previous research, the activities most likely to have taken place in Damage Area 1 include domestic activities, such as preparing meals, processing and storing resources, manufacturing goods, and sleeping (Hackbarth and Craig 2004; Hart and Craig 2003, 2006). It was anticipated that exotic artifacts, such as shell or obsidian, would be identified within Damage Area 1. Within Damage Area 2, it is probable that non-habitation activities (such as collecting resources and conducting agricultural activities) would have taken place (Greenwald et al. 1994).

Questions related to the theme of site function include:

- *What types of artifacts are present that may inform the theme of site function?*
- *Are these artifacts consistent with those reported by other researchers in Damage Areas 1 and 2?*

3.2.3 Exchange and Interaction

This damage assessment theme focuses on how prehistoric populations produced and transferred goods and services across the social landscape. The relevance of this theme is based on previous research in the area, specifically as it relates to exchange of locally available resources (such as Buff ware ceramics, marine shell, Superior obsidian). The northern Queen Creek Delta represents an ideal location to investigate exchange and interaction, because the area was likely a transportation corridor between Queen Creek and the lower Salt River, the middle Gila River, and beyond (Hart and Craig 2006; Henderson 2006). Previous studies have demonstrated changes in the distribution of resources between nearby communities through time. This theme also includes long -distance exchange, indicated by the presence of marine shell, turquoise, non-Huhugam ceramics, and other exotic trade items.

Questions related to the theme of exchange and interaction include:

- *Are exotic trade materials present in the assemblage observed at [REDACTED]?*
- *Is marine shell present? Does the evidence indicate marine shell ornament production? Do specific species indicate Gulf of California versus Pacific Coast trade (e.g., *Olivella dama* versus *Olivella biplicata*)?*
- *Are any non-local ceramics present at the sites? What are their sources? Does the evidence indicate Ancestral Puebloan trade?*

4. Geomorphological Context

A geomorphological assessment of the extent of subsurface damage within the [REDACTED] in Damage Areas 1 and 2 at [REDACTED] was a primary focus of the invasive damage assessment field work. This section summarizes the geomorphological context of the Damage Areas to better inform the results of the field work.

4.1 *Setting*

Damage Area 1 and Damage Area 2 within [REDACTED] are at the northern margin of the Basin and Range physiographic province, within a broad, level, alluvial plain in the lower Queen Creek drainage (the Queen Creek Delta) portion of the Phoenix Basin (Fenneman 1931). The delta is defined as the portion of the western Queen Creek that transitions from a channelized perennial stream to hyporheic flow (under the stream flow with ephemeral surface flow) within the distal portion of a broad coalescing series of alluvial fans (piedmont). Damage Areas 1 and 2 are north of Queen Creek, which flows west from the Superstition Mountains into the Gila River.

4.2 *Geology and Soils*

Geologic mapping by Wilson et al. (1957) indicates Damage Areas 1 and 2 occur in an area dominated by early Quaternary (Pleistocene) sand, gravel, and conglomerate (QTs). The Damage Areas are also mapped by Spencer et al. (1996) as basin-floor deposits of fine-grained relict alluvial fan and terrace deposits of late to middle Pleistocene (Qmlf) that consist of sand, silt, clay, fine gravel and substantial soil clay accumulation. Other researchers (Richard et al. [2000] and Spencer et al. [2000]) redefine the geologic mapping of the area that both Damage Areas to consist of Holocene (0 to 10 kilo annum [ka]) surficial deposits (Qy) within the Higley Basin. As defined by Richard et al. (2000), Qy consists of unconsolidated fine-grained, well sorted sediments deposited on alluvial plains, alluvial fans, and terraces. The Qy further appears to directly overlie Late and Middle Pleistocene (10 to 750 ka) surficial deposits (Qm) that consist of unconsolidated to weakly consolidated alluvial fan, terrace, and basin-floor deposits with moderate to strong soil development (Richard et al. 2000).

The United States Department of Agriculture Natural Resource Conservation Service's (NRCS's) 2024 Web Soil Survey indicates Damage Areas 1 and 2 are mapped as Gilman loam (Gm) that forms on alluvial fans and floodplains (NRCS 2024). Gilman soils are Typic Torrifluvents that typically do not form a solum (soil horizon) other than an A Horizon, because of the dynamic setting they are formed on. Gilman soils are described as very deep, well-drained soils that formed in stratified alluvium on 0 to 3% slopes. In typical profile, Gilman soil exhibits an A Horizon that is plowed (disturbed) (Ap Horizon) from 0 to 32 cm that consists of a 10YR 6/3 brown loam that is slightly hard, friable, and slightly effervescent because of the presence of carbonates, and is moderately alkaline. The soil is weakly developed (exhibiting no B Horizon subsoil) and directly overlies stratified very fine sandy loam sediments (C Horizon) that may contain minor gravels. The C Horizon carbonate content and alkalinity increases with depth and may display concentrations and induration due to carbonate content (caliche). The typical depth to a calcic horizon in Gilman soils is about 1 meter (m) below ground surface (bgs) (NRCS 2024).

Gilman soils may be underlain by Mohall soils that have surface expressions in more eroded areas near Damage Areas 1 and 2. Mohall soils display A/Bk soil horizons with Bk horizons containing indurated soil carbonates (Bkm horizons), colloquially referred to as caliche. Regional soil geomorphic studies (Machette 1985; Sigalove 1969; Bull 1991) indicate such well developed soil horizons are middle Pleistocene or older, and essentially represent bedrock from an archaeological perspective. Gilman soils are too young to have formed well-developed pedogenic accumulations, such as carbonates (caliche). However, underlying Mohall soils and analogous sediments are old enough to form zones of accumulation (B Horizon) and carbonate accumulations such as caliche.

5. Damage Area 1 Invasive Damage Assessment Field Work Summary

Major damage occurred in Damage Area 1 from the excavation of a large retention basin (Powell 2024) (Figures 4 and 5). Approximately 8.5 acres of land were disturbed in Damage Area 1, and approximately 25,000 cubic yards of soil were removed as a result of the [REDACTED] construction (Appendix B). As discussed in Luhnnow and Powell (2024), two invasive damage assessment activities took place in Damage Area 1: geomorphological trenching, and profiling and screening a large [REDACTED].

Figure 4. Overview of [REDACTED] in Damage Area 1, pre-invasive damage assessment field work, looking west-southwest.

FIGURE REDACTED

Figure 5. Overview of [REDACTED] in Damage Area 1, post-invasive damage assessment field work, looking north from top [REDACTED].

FIGURE REDACTED

5.1 *Geomorphological Assessment*

The focus of the geomorphological trenches and profiles was to define the level of recent site disturbance, as well as the potential for archaeological deposits and features to have been removed by [REDACTED] excavation, and to determine whether there was a potential for intact archaeological features to still exist within the [REDACTED] in Damage Area 1. The geomorphological assessment focused on the identification of buried Holocene surface soils (paleosols), depositional environments that indicate a potential to contain those facies, and potential buried archaeological deposits within and below the disturbance zones.

5.1.1 Geomorphological Recording Standards

The geomorphological investigation consisted of examining [REDACTED] to identify the characteristics of the depositional environment and the presence of soil development, to then obtain information on the landform's geomorphological, sedimentological, and stratigraphical development. The investigations also focused on identifying evidence of anthropogenic (human-generated) effects or occupations, or bioturbation (animal-generated disturbance) of sediments and soils.

Standard field recording procedures were used to document the geological and pedological environment of each stratigraphic unit within and between trenches. The following sediment characteristics were also described:

- Sediment texture and grain size (using triplet 10x hand lens) based on Wentworth (1922)
- Munsell color
- Mottling (redoximorphic features)
- Structure

- Consistence
- Stickiness and plasticity
- Rupture resistance
- Root content
- Evidence of caliche (mycelia, nodules, beds)
- Evidence of fluvial (coarse-grained sediments) or lacustrine sediments (laminations)
- Bedding
- Sorting
- Boundary contacts between stratigraphic units

Soil horizon nomenclature followed the NRCS field guide (Schoeneberger et al. 2002), as well as Holliday (1990). Lithological and sedimentary nomenclature followed the International Stratigraphic Guide (Hedberg 1976; Stein 1990).

5.1.2 Backhoe Trenching and Profiling Methods

Three geomorphological test trenches were excavated mechanically in the [REDACTED] in Damage Area 1 (Figure 6). No trenches were placed in areas that were not previously disturbed by the archaeological site damage. The trenches were dug with a backhoe equipped with a 2-foot-wide toothless bucket (Table 2; Figures 6 and 7). All trench excavations followed applicable Occupational Safety and Health Administration regulations (29 CFR 1926.652 Subpart P–Excavations).

Each trench was plotted using a Trimble R1 receiver capable of 10-cm accuracy, assigned a unique identifying number, and recorded with a 1-m sample profile.

The project field director and project geomorphologist monitored all trenching. Trenching spoils were visually examined but were not screened. After the geomorphological assessment, each trench was backfilled to standard compaction. In Damage Area 1, the geomorphological trenching was completed before any further ground-disturbing work was initiated, so that soils were not mixed.

Once trenches were excavated, archaeologists shovel-scraped both faces of the entire trench to determine the most representative location to profile and log sediments and soils. The selected trench section was then hand-troweled for a cleaner exposure of trench wall stratigraphy. Using standard stratigraphical recordation, a level line was established above the selected wall section, and each stratigraphic unit (soil or sediment) was scribed by trowel and photographed (Figure 8). After photography, the wall section was hand-sketch mapped (north and south pins of level line), then Jacobs' geomorphologist recorded and described each stratigraphic unit, following methods and standards of Schoeneberger et al. (2002), Rapp and Hill (1998), Munsell (1994), Boggs (2001), Stein (1990), Holliday (1990) and Wentworth (1922).

Figure 6. Plan view of geomorphological trenches, trench profiles, and basin sidewall profiles in Damage Area 1.

FIGURE REDACTED

Table 2. Geomorphological Trench Summary and Associated Trench Profiles

Trench No.	Associated Profile No.	Trench Dimensions L x W x D (m)	Observations
U01	PF 1 (East Wall)	20.50 x 0.68 x 1.30	Light charcoal flecking in PF 1
U02	PF 2 (West Wall)	20.10 x 0.68 x 1.30	None
U03	PF 3 (West Wall)	20.76 x 0.70 x 1.05	None

D = depth, L = length, W = width

Figure 7. Representative photograph of geomorphological trench, U03, looking northeast.

FIGURE REDACTED

Figure 8. Representative photograph of trench profile unit, PF1, in geomorphological trench U01, looking east.

FIGURE REDACTED

5.1.3 Sample Basin Facing and Profiling Methods

The Damage Area 1 [REDACTED] were recorded in three profile units (designated as PF7, PF8, and PF9). [REDACTED] profile units were initially scraped by shovel, then finished with a trowel to produce a 2-m-wide clean surface exposure of the bank stratigraphy. Once cleaned, each profile was hand-scribed by trowel to mark distinct sediments and soils. After scribing, the profile was photographed, then drawn by hand in side view to show the stratigraphy exposure in sloped form, and vertically to show the actual thickness of each sediment and soil. Measurements were taken in cm below a level datum line set above the [REDACTED] rim. Each profile was plotted using a Trimble R1 receiver capable of 10-cm accuracy, and each profile was assigned a unique identifying number (Table 3; Figures 6 and 9).

Within the profiles, each distinct sediment and soil observed was assigned a unique unit number (such as Soil Unit 1). Each sediment and soil unit were then described by sedimentary regime (alluvial fan, alluvium, and such) or Master soil horizon (such as A Horizon) with standard soil suffixes (“p” for plowzone, “k” for carbonates). The sediment or soil unit was then described by Munsell soil color, texture, grain size, and the presence of inclusions, such as roots or rocks. The [REDACTED] profiles extended from the [REDACTED] so the profiles could correlate with geomorphological trench profiles.

The purpose of the sample sidewall facing was to define the stratigraphic profile exposed in the [REDACTED] and to cross-reference it with previous stratigraphic data provided by past researchers (Hackbarth and Craig 2004; Hart and Craig 2003).

Table 3. [REDACTED] Profile Summary

Profile No.	Type of Profile	Associated Trench No.	Dimensions W x D (m)	Observations
PF 1	Trench	U01	2.00 x 1.25	Light charcoal flecking
PF 2	Trench	U02	2.00 x 1.24	None
PF 3	Trench	U03	2.00 x 1.22	None
PF 7	[REDACTED]	N/A	2.00 x 3.60	Charcoal present
PF 8	[REDACTED]	N/A	2.00 x 4.00	Charcoal present
PF 9	[REDACTED]	N/A	2.00 x 3.28	Charcoal present

Figure 9. Representative photograph of basin sidewall profile PF 7, looking east-northeast.

FIGURE REDACTED

5.1.4 Geomorphological Summary

The overall geomorphology and stratigraphical sequence of Damage Area 1 consists of interdigitated Holocene alluvial fan and alluvial plain and floodplain sediments (Qy) with intercalated facies of soil formation (paleosols) that all formed during the Holocene following erosion of underlying Pleistocene sediments and soils (Qm), which likely occurred during the late Pleistocene era. The stratigraphic break between the Holocene and Pleistocene sediments and soils is marked by a distinct unconformity at the base of Damage Area 1 Soil Units 10 and 12.

Within Damage Area 1, the [REDACTED] excavation appears to have removed a total of 10 Holocene stratigraphic units (designated as Soil Units 1 to 10), which encapsulated three buried A Horizons (paleosols) that demonstrate evidence of cultural activity, such as the presence of charcoal (Soil Units 2-Ab, 8-2Ab, and 9-3Ab) (Figure 10).

Soil Units 1 through 10 consist of an alternating sequence of sandy silt alluvium (as demonstrated in Soil Units 1, 2, 3, 5, 6, 8, 9) and silt distal alluvial fan deposits (as demonstrated in Soil Units 4, 7, and 10). Surface soils (A horizons) (Soil Units 1, 2, 8, 9) appear to have been formed within alluvium before they were buried by post-occupational alluvial fan deposits. At least 3 separate human occupations are demonstrated by the [REDACTED] (Soil Units 2, 8, and 9), with Soil Unit 1 as a plowed A Horizon (Ap Horizon) that may or may not be a separate occupation (similar to Units 8 and 9) from Soil Unit 2. These Holocene sediments correlate with Gilman soils mapped by the NRCS (2024) at this location.

Holocene alluvial and fan deposits extend below the current [REDACTED], as demonstrated in trench profiles PF 1, PF 2, and PF 3. The floor of the excavated [REDACTED] of Damage Area 1 is within Soil Unit 10, which is an alluvial fan deposit of silt. Holocene sediments extend to the base of Soil Unit 12 in Trench U01 and Trench U02, but they only extend to the base of Soil Unit

10 in Trench U03. The base of Soil Unit 12 in Trench U01 and Trench U02, and the base of Soil Unit 10 in Trench U03, mark an unconformity: a surface that indicates a depositional regime has been interrupted by a period of erosion that has removed sediments or soils.

The unconformity suggests Holocene alluvial and fluvial forces removed the upper sequence of Pleistocene sediments and soils before Soil Units 12, 11 and 10 were deposited (chronologically). The unconformity shown on Figure 10 also suggests a natural basin was formed in Damage Area 1 during this process, whereas the eastern flank of the natural basin is around Trench U03 and deepens to the west, past Trench U01. Soil Units 1 to 10 likely correlate with Holocene surficial deposits (Qy) (0 to 10ka) mapped by Richard et al. (2000). No evidence of cultural occupation was observed below the current [REDACTED], and no Holocene Ab horizons were observed below the current [REDACTED] of Damage Area 1.

Pleistocene (pre-cultural) stratigraphic units (designated as Soil Units 13 to 17) exposed in Damage Area 1 trenches display a series of well-developed solum (A and B horizons). The surface horizon between Soil Units 10 and 13 of Trench U03 has been removed (eroded), leaving a remnant lower solum (B Horizon) mapped as 4Bkt (buried B Horizon with accumulations of carbonates [k] and clay [t]). An intact solum is noted in Soil Units 14 and 15 (5Abkt/5Bkt); however, an isolated Ab Horizon is noted in U02 as Soil Unit 16 (6Abkt), which overlies an older Ab Horizon of Unit 17 (7Abkt). The lower solum of Unit 17 was not exposed/reached in trench excavations. Pleistocene Soil Units 13 to 17 appear to correlate with Late and Middle Pleistocene surficial deposits (Qm) (10 to 750ka) mapped by Richard et al. (2000). Pleistocene sediments and soils also appear to correlate with Mohall soils mapped nearby by NRCS (2024). Based on Sigalove (1969), these soils are very old and are considered to be pre-cultural and archaeologically sterile.

Soils encountered below the Gilman surface soils (Qy-Holocene units) in Damage Area 1 appear to correlate with nearby surface soils mapped as Mohall series soils (79) that formed on fan terraces. Mohall soils are described as very deep, well-drained soils that formed in fan and stream alluvium from mixed sources on fan terraces, stream terraces and relict basin floors with 0 to 85% slopes. These soils are very old, well-developed soils with a very thin, 7.5YR 6/6 reddish yellow sandy loam A Horizon from 0 to 8 cm that overlies a well-developed 7.5YR 5/6 loam B Horizon (subsoil) from 8 to 92 cm (NRCS 2024). With depth, Mohall soil solum demonstrates increased carbonate and clay content developed by eluviation and illuviation pedogenic processes over time. Calcium carbonate filaments and nodules are typically observed within the middle B Horizon, about 47 cm bgs that increases in content with depth and is most concentrated within the lower B Horizon just above the underlying C Horizon. The B Horizon is underlain by a gravelly sandy loam C Horizon. Within Damage Area 1, Mohall soils appear to have been partially eroded (unconformity) before the deposition of later Holocene sediments associated with Gilman soils.

Figure 10. Schematic of Soil Units observed in Damage Area 1.

FIGURE REDACTED

5.1.5 Geomorphological Correlation and Summary

Hackbarth and Craig (2004) conducted testing within a portion of Damage Area 1. Approximately 33 trenches were placed within Damage Area 1, between 10 and 40 m apart, with shorter intervals within areas of high artifact density. Because of the spacing, additional undocumented features may have been present between trenches. The testing resulted in the recording of numerous features:



All features were only profiled, though Feature 4 [REDACTED] in Hackbarth and Craig's (2004) Trench 1 was recorded at 69 cm bgs and was partially tested. Feature 4 contained modern debris that may indicate intrusive looting. Trench 1 is within Artifact Concentration 1 of Damage Area 1.

Hackbarth and Craig (2004) describe Damage Area 1 soils as mostly remnant aeolian deposits of variable thickness, with an upper zone of unconsolidated sand above a slightly more compact stratum. Generally, upper strata (-20 cm bgs) are more compact, which the authors suggest is indicative of an older or more stable environment. The authors noted the following stratigraphic sequence within Damage Area 1:

- Stratum I is compact clayey silt overlaying cultural features. No correlation to this study.
- Stratum II is light brown, slightly compacted fine-grained sandy silt (cultural horizon). Appears to correlate with Soil Units 1 to 9 of this assessment.
- Stratum III, the lowest stratum at approximately 1-m deep, is fine silty sand with traces of an orange color. Appears to correlate with Soil Units 10 to 12 of this assessment.

Hart and Craig (2003, 2006) conducted testing and data recovery along a linear corridor south of Damage Area 1. The strata described by Hart and Craig (2003, 2006) appear to correlate with the strata of this study as follows:

- Stratum I (0 to 25 cm bgs) is tannish sandy silt overlaying cultural features. Correlates to Soil Units 1 and 2 of this study.
- Stratum II (25 to 90 cm bgs) is gray-brown, compact, fine sandy silt (cultural horizon). Correlates to Soil Units 3 to 9 of this study.
- Stratum III (90+ cm bgs) is tan brown, silty sand. Correlates to Soil Units 10 to 12 of this study.

- An [REDACTED] was documented southeast of Damage Area 1 at 80 cm bgs and dates to Classic period (AD 1150 to AD 1450). Correlates with Soil Units 8 and 9 of this study).
- A Pleistocene-age tortoise was identified at approximately 2.0 m bgs. Correlates to Soil Units 13 to 17 of this study.

Based on this geomorphological study, the mechanical excavation of the Damage Area 1 [REDACTED] resulted in the removal of archaeological features, artifacts, and scientifically important paleosols (buried A Horizons) associated with local occupations of the area. The mechanical excavation has removed most of the Holocene archaeological record for the portion of [REDACTED] within the retention basin. Based on this assessment, there is no remaining archaeological potential within the Damage Area 1 [REDACTED].

5.2 Sample Screening of [REDACTED]

Major damage occurred within Damage Area 1, from the [REDACTED] (Powell 2024) (Figure 11). The goal of screening the [REDACTED] was to determine whether any [REDACTED].

A 2% sample was conducted for the screening of soil from the [REDACTED]. Based on the estimated 4,787 cubic yards of soil within the material stockpile, the 2% sample consisted of screening of approximately 96 cubic yards of soil (Figure 11).

Figure 11. Overview of [REDACTED], pre-screening, looking north.

FIGURE REDACTED

The methods for sample screening were developed based on input received during a consulting party meeting held on May 1, 2024. These methods were refined during government-to-government consultation between OEA and the Salt River Pima-Maricopa Indian Community Tribal Historic Preservation Office and the Gila River Indian Community Tribal Historic Preservation Office on May 24, 2024.

5.2.1 Field Methods

Eight backhoe trenches were placed throughout the [REDACTED] to obtain a representative sample of existing materials. The trenches were excavated using a backhoe equipped with a toothless 2-ft (0.61-m)-wide bucket. Each trench measured approximately 10 m long by 0.61 m wide, although some slight variation occurred due to the stability of the [REDACTED] (Table 4; Figure 12 and Figure 13). The maximum depth of each trench was the [REDACTED], and the depth of each trench varied based on the existing height of the [REDACTED]. [REDACTED] contained unconsolidated soil that did not contain any internal stratigraphy. A qualified archaeologist monitored the excavation of each trench.

Trenches were excavated one at a time to prevent fill from different trenches from mixing within the [REDACTED]. All soil from each trench was completely screened through 0.25-inch mesh using tripod screens. Screening occurred within the disturbance limits of the [REDACTED]. Canvas tarps were placed under individual screening backdirt piles so materials would not mix (Figure 14).

The backhoe excavated material from each trench into a single sample soil pile, which was then transported to individual hand-screening locations using 5-gallon buckets. Materials were screened into wheelbarrows and transported into segregated piles. After an individual trench was screened, the screened soil matrix was stockpiled within the retention basin in Damage Area 1 before a new trench was excavated. All screened soil matrix was individually stockpiled in the western portion of the [REDACTED] (Figure 6 and Figure 15).

Table 4. Stockpile Trench Summary

Trench No.	Dimensions L x W x D (m)	Artifact Classes Present	Observations
7	9.50 x 0.95 x 1.45	Ceramics, flaked stone, historic	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
8	11.00 x 0.90 x 3.07	Ceramics, flaked stone	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
9	10.90 x 0.90 x 2.97	Ceramics, faunal bone, historic	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
10	11.30 x 0.85 x 2.04	Ceramics, groundstone, flaked stone, shell, faunal bone	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
11	9.65 x 0.80 x 2.92	Ceramics, flaked stone, historic	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
12	10.65 x 0.80 x 2.36	Ceramics, flaked stone, faunal bone	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
13	11.75 x 0.90 x 1.77	Ceramics, shell, faunal bone	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present
14	11.75 x 0.70 x 0.66	Faunal bone	Unconsolidated fill with gravels. Sparse numbers of artifacts and modern debris present

Figure 12. Plan view of [REDACTED] and screened spoils pile locations.

FIGURE REDACTED

Figure 13. Representative photograph of Trench 12, looking north.

FIGURE REDACTED

Figure 14. Overview of [REDACTED] screening activity, looking north.

FIGURE REDACTED

Figure 15. Overview of screened spoils piles, post-screening, looking east.

FIGURE REDACTED

5.3 In-field Artifact Analysis

Artifacts were not observed during the geomorphological investigations in Damage Area 1. A limited number of artifacts were encountered while the [REDACTED] trenches were hand-screened. Many of these were modern items. Construction debris was encountered in all excavated trenches in the material stockpile (such as chunks of concrete, rebar, and decaying lath) (Trenches 7 to 14) (Table 5).

All artifacts from each trench in the [REDACTED] were collected daily, and were bagged individually by date and trench number. Metal artifacts exhibiting oxidation were considered historic and were collected. Wood fragments, concrete, plastic, and metal artifacts that did not exhibit oxidation were not collected but were noted on standardized forms as a component of material stockpile disturbance.

All collected artifacts were analyzed in the field, according to the protocols outlined in Luhnnow and Powell (2024), which focused on their count, chronological definition and affiliation, and functional type (Table 6). After the in-field analysis, all artifacts collected during daily activities were returned to their respective screened backdirt trench stockpiles. Walter Punzmann, M.A., analyzed the historic artifacts. Oliver Klush, B.A., analyzed the faunal bone. Glenda Luhnnow, M.A., RPA, analyzed the shell and lithic artifacts. Kris Powell, M.A., RPA, analyzed the precontact ceramics.



Table 5. Summary of Disturbance Items

Item Type	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	Trench 14	Total
Thin wire fragment	6	21	48	12	17	27	6		137
Thick wire fragment	1		5	1	3	1	3		14
Nail – Wire, finishing, double-headed	6	27	21	9	13	13	11		100
Nail, cut	1								1
Green bottle glass fragment (modern)	1			1	1	2	1		6
Brown bottle glass fragment (modern)						2			2
Clear bottle glass fragment (modern)				1		1			2
Unidentified metal fragment				2	4		2		8
Metal rebar fragment		2	1		1	1			5
Assorted screws	3	3	1	1		3	1		12
Assorted bolts						2			2
Assorted nut & bolt						1			1
Concrete floor fragment		1		1		1		1	4
PVC pipe fragment			1						1
Ceramic tile fragment				1	1				2
Clear window glass fragment			1						1

Item Type	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	Trench 14	Total
Sanitary can base	1								1
Chewing tobacco can lid (modern)						1			1
Metal strap fragment		4	1						5
Metal tag on a wire			1						1
Metal T-post blade			1						1
Metal staple				1		1			2
Metal sheet fragment				4					4
Burned wood lumber fragment		1							1
Master padlock, keyed		1							1
Plastic glow stick	1								1
Unidentified electrical device					1				1
TOTAL	20	60	81	34	41	56	24	1	317

Table 6. Summary of In-field Artifact Analysis

Artifact Type	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	Trench 14	Total
Ceramics									
Unidentified Buffware	1	-	-	4	1	-	2	-	8
Unidentified Buffware Bowl	-	-	1	-	-	-	-	-	1
Unidentified Buffware Jar	-	-	4	-	1	-	-	-	5
Gila/Pinto Polychrome Bowl	-	-	-	1	-	-	-	-	1
Gallup Black-on-white Bowl	-	-	1	-	-	-	-	-	1
Wingfield Jar	-	-	-	1	-	-	-	-	1
Unidentified Plainware, Salt Variety	-	-	-	-	3	-	3	-	6
Unidentified Plainware, Gila Variety	-	6	8	1	6	2	10	-	33
Gila Plainware Bowl	-	-	-	-	-	1	-	-	
Salt Plainware Jar	-	1	-	1	-	-	-	-	2
Salt Plainware Bowl	-	1	-	-	-	-	-	-	2
Salt Redware Jar	-	-	-	1	2	1	2	-	6
TOTAL (Ceramics)	1	8	14	9	13	4	17		66
Groundstone									
Mano fragment, unifacial, granite				1					1
TOTAL (Groundstone)				1					1

Artifact Type	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	Trench 14	Total
Flaked Stone									
Flake fragment, fully cortical, chert						1			1
Flake, complete, non-cortical, basalt				1					1
Flake, complete, non-cortical, rhyolite	1			1					2
Flake shatter, non-cortical, chalcedony		1							1
Flake shatter, partially cortical, chert					1				1
Flake, complete, non-cortical, chert					1				1
Flake, fragment, non-cortical, metavolcanic					1				1
Flake shatter, non-cortical, chert					1				1
TOTAL (Flaked Stone)	1	1		2	4	1			9
Shell									
<i>Laevicardium</i> sp., valve fragment, unworked				1			1		2
TOTAL (Marine Shell)				1			1		2
Faunal									
Rodentia, Mus, mandible			1						1
Small-medium mammalia, C2/Axis			1						1

Artifact Type	Trench 7	Trench 8	Trench 9	Trench 10	Trench 11	Trench 12	Trench 13	Trench 14	Total
Amphibia, Anura, tibiofibula				1					1
Small mammalia, metapodial						1			1
Leporidae Sylvilagus, cervical vertebra							1		1
Small aves, coracoid							1		1
Small aves, tibiotarsus							1		1
Artiodactyla, rear/pedal phalanx II								1	1
TOTAL (Faunal)			2	1		1	3	1	8
Historic									
Brown bottle finish and neck glass fragment, Extract lip of Prescription lip finish, (circa 1890s-1940s)	1								1
12-gauge shotgun shell base inscribed w/: FEDERAL/12/GA/CARTRIDGE (circa 1960s to present)			1						1
Sun-colored amethyst glass bottle body fragment (circa 1880-1917)					1				1
TOTAL (Historic)	1		1		1				3

6. Damage Area 2 Invasive Damage Assessment Fieldwork Summary

Major damage resulting from the excavation of a [REDACTED] occurred in Damage Area 2 (Powell 2024) (Figure 16). Approximately 6 acres of land were disturbed in Damage Area 2 and approximately 15,500 cubic yards of soil were removed as a result of the [REDACTED] construction (Appendix B). As discussed in Luhnnow and Powell (2024), one invasive damage assessment activity was conducted in Damage Area 2: geomorphological trenching and profiling (Figure 17).

Figure 16. Overview of [REDACTED] in Damage Area 2, pre-invasive damage assessment field work, looking north.

FIGURE REDACTED

Figure 17. Overview of [REDACTED] in Damage Area 2, post-invasive damage assessment field work, looking north.

FIGURE REDACTED

6.1 Geomorphological Assessment

The focuses of the intrusive damage assessment geomorphological trenches and profiles were as follows:

- Define the level of recent site disturbance, the potential for archaeological deposits and features to have been removed by [REDACTED].
- Determine whether there was any potential for intact archaeological features to still exist within the [REDACTED] in Damage Area 2.

The geomorphological assessment focused on identifying buried Holocene surface soils (paleosols), depositional environments that indicate a potential to contain those facies, and potential buried archaeological deposits within and below the disturbance zones.

6.1.1 Geomorphological Recording Standards

The geomorphological investigation consisted of examining the [REDACTED]. The purpose of the examination was to identify the characteristics of the depositional environment and the presence of soil development, to then obtain information about the landform's geomorphological, sedimentological, and stratigraphical development. The investigations focused on identifying evidence of anthropogenic (human-generated) effects or occupations, or bioturbation (animal-generated disturbance) of sediments and soils.

Standard field recording procedures were used to document each stratigraphic unit's geological and pedological environment within and between trenches. The following sediment characteristics were described:

- Sediment texture and grain size (using triplet 10x hand lens) based on Wentworth (1922)
- Munsell color

- Mottling (redoximorphic features)
- Structure
- Consistence
- Stickiness and plasticity
- Rupture resistance
- Root content
- Evidence of caliche (mycelia, nodules, beds)
- Evidence of fluvial (coarse-grained sediments) or lacustrine sediments (laminations)
- Bedding
- Sorting
- Boundary contacts between stratigraphic units

Soil horizon nomenclature followed the NRCS field guide (Schoeneberger et al. 2002), as well as Holliday (1990). Lithological and sedimentary nomenclature followed the International Stratigraphic Guide (Hedberg 1976; Stein 1990).

6.1.2 Backhoe Trenching and Profiling Methods

Three geomorphological test trenches were excavated mechanically in the [REDACTED] in Damage Area 2 (Figure 18). No trenches were placed in areas that were not previously disturbed by the archaeological site damage. The trenches were dug with a backhoe equipped with a 2-ft-wide toothless bucket (Table 7). All trench excavations followed applicable Occupational Safety and Health Administration regulations (29 CFR 1926.652 Subpart P–Excavations).

Each trench was plotted using a Trimble R1 receiver capable of 10-cm accuracy, assigned a unique identifying number, and recorded with a 1-m sample profile.

The project field director and project geomorphologist monitored all trenching. Trenching spoils were visually examined, but were not screened. After the geomorphological assessment, each trench was backfilled to standard compaction.

After the initial excavation and shovel-scraping and before profiles and photographs were completed, a monsoon flood inundated Damage Area 2 and open trenches. Figures 19 and 21 show the trench conditions after the inundation (Figure 19 and Figure 20).

Once trenches were excavated, archaeologists shovel-scraped both faces of the entire trench to determine the most representative location to profile and log sediments and soils. The selected trench section was then hand-troweled for a cleaner exposure of trench wall stratigraphy. Using standard stratigraphical recordation, a level line was established above the selected wall section, and each stratigraphic unit (soil or sediment) was scribed by trowel and photographed (Figure 21). After photography, the wall section was hand-sketch mapped (north and south pins of level line), then Jacobs' geomorphologist recorded and described each stratigraphic unit, following the methods and standards of Schoeneberger et al. (2002), Rapp and Hill (1998), Munsell (1994), Boggs (2001), Stein (1990), Holliday (1990) and Wentworth (1922).

Figure 18. Plan View of Geomorphological Trenches and Profiles in Damage Area 2

FIGURE REDACTED

Table 7. Geomorphological Trench Summary and Associated Trench Profiles

Trench No.	Associated Profile No.	Trench Dimensions L x W x D (m)	Observations
4	PF 4 (East Wall)	20.20 x 0.80 x 1.40	None
5	PF 5 (West Wall)	20.10 x 0.84 x 1.45	None
6	PF 6 (West Wall)	20.50 x 0.90 x 1.48	None

Figure 19. Post-inundation conditions in Damage Area 2, looking northeast.

FIGURE REDACTED

Figure 20. Representative photograph of geomorphological trench, U05, after inundation had dried but trench damage is visible, looking south.

FIGURE REDACTED

Figure 21. Representative photograph of trench profile unit, PF 6, in geomorphological trench U06, looking east.

FIGURE REDACTED

6.1.3 Facing and Profiling Methods

Damage Area 2 were recorded in two profile units (designated as PF10 and PF 11). profile units were initially scraped by shovel, and were then finished with a trowel to produce a 2-m-wide clean surface exposure of the bank stratigraphy. Once cleaned, each profile was hand-scribed by trowel to mark distinct sediments and soils. After scribing, the profile was photographed, then drawn by hand in side view to show the stratigraphy exposure in sloped form, and vertically to show the actual thickness of each sediment and soil. Measurements were taken in cm below a level datum line set above the retention basin rim. Each profile was plotted using a Trimble R1 receiver capable of 10-cm accuracy, and each profile was assigned a unique identifying number (Table 8; Figures 18 and 22).

With the profiles, each distinct sediment and soil observed was assigned a unique unit number (such as Unit 1). Each sediment and soil unit were then described by sedimentary regime (alluvial fan, alluvium, and such) or Master soil horizon (A Horizon) with standard soil suffixes (“p” for plowzone, “k” for carbonates). The sediment or soil unit was then described by Munsell soil color, texture, grain size, and the presence of inclusions, such as roots or rocks. The retention basin profiles extended from the so the profiles could correlate with geomorphological trench profiles.

The purpose of the was to define the stratigraphic profile exposed in the , and to cross-reference it with previous stratigraphic data provided by past researchers (Greenwald et al. 1994; Phillips 2000).

Table 8. [REDACTED] Sidewall Profile Summary

Profile No.	Type of Profile	Associated Trench No.	Dimensions W x D (m)	Observations
PF 4	Trench	4	2.00 x 1.40	None
PF 5	Trench	5	2.00 x 1.42	None
PF 6	Trench	6	2.00 x 1.45	None
PF 10	[REDACTED]	Not applicable	2.00 x 3.30	None
PF 11	[REDACTED]	Not applicable	2.00 x 3.28	None

Figure 22. Representative photograph of [REDACTED] profile PF 11, looking west.

FIGURE REDACTED

6.1.4 Geomorphological Summary

The overall geomorphology and stratigraphical sequence of Damage Area 2 consists of interdigitated Holocene alluvial fan and alluvial plain and floodplain sediments (Qy) with intercalated facies of soil formation (paleosols) that all formed during the Holocene following the erosion of underlying Pleistocene sediments and soils (Qm), which likely occurred during the late Pleistocene era. The stratigraphic break between the Holocene and Pleistocene sediments and soils is marked by a distinct unconformity at the base Damage Area 2 Soil Unit 9 (Figure 23).

Within Damage Area 2 (Figure 23), a similar stratigraphic sequence to Damage Area 1 was recorded, and is characterized by alternating sandy silt alluvium and silt distal alluvial fan deposition (Soil Units 1 to 8). However, only one buried A Horizon (Ab Horizon-Soil Unit 3) was observed and one surface A Horizon that was plowed (Ap Horizon-Soil Unit 1) was identified. Laminations were also noted at the base of Soil Unit 8, which suggests a period of standing water that lasted long enough to deposit seasonal varves. The varves are discontinuous and broken in place, and suggest an erosional cycle before the Soil Unit 7 alluvium was deposited. Unit 9 is a gravelly sand alluvium that is poorly sorted and indicates a flood deposit, or series of flood deposits, that are capped by base laminations of Soil Unit 8 that may represent post-flood standing water. The Holocene sediments of Damage Area 2 correlate with Gilman soils mapped by the NRCS at this location.

Soil Unit 10 of Damage Area 2 (Figure 23) appears to be a Pleistocene-age fluvial channel deposit of gravelly sand that displays mycelia and nodule caliche formation. The top of Soil Unit 10 is an unconformity that separates the Holocene Qy deposits from the underlying Pleistocene Qm deposits. Pleistocene sediments appear to correlate with Mohall soils mapped nearby by the NRCS (2024) atop Pleistocene terraces and floodplains.

No buried soil horizons (Ab Horizons) were noted in Trenches U04, U05, or U06 in Damage Area 2. Mechanical compression (loading) damage, as determined by the presence of the platy jointing of fine sediments below the [REDACTED], was noted to extend well into Unit 7 in all three trenches. Compression damage was also noted below the [REDACTED]

██████ of Damage Area 1. The mechanical loading of sediments is thought to realign clay minerals into a horizontal arrangement, causing the sediments to part horizontally.

Soils encountered below the Gilman surface soils (Qy-Holocene units) in Damage Area 2 appear to correlate with nearby surface soils mapped as Mohall series soils (79) that formed on fan terraces. Mohall soils are described as very deep, well-drained soils that formed in fan and stream alluvium from mixed sources on fan terraces, stream terraces and relict basin floors with 0 to 85% slopes. These soils are very old, well-developed soils with a very thin, 7.5YR 6/6 reddish yellow sandy loam A Horizon from 0-8cm that overlies a well-developed 7.5YR 5/6 loam B Horizon (subsoil) from 8-92cm (NRCS 2024). With depth, Mohall soil solum demonstrates increased carbonate and clay content developed by eluviation and illuviation pedogenic processes over time. Calcium carbonate filaments and nodules are typically observed within the middle B Horizon, about 47 cm bgs that increases in content with depth and is most concentrated within the lower B Horizon just above the underlying C Horizon. The B Horizon is underlain by a gravelly sandy loam C Horizon. Within Damage Area 2, Mohall soils appear to have been partially eroded (unconformity) before the deposition of later Holocene sediments associated with Gilman soils.

Figure 23. Schematic of Soil Units observed in Damage Area 2.

FIGURE REDACTED

6.1.5 Geomorphological Correlation and Summary

Phillips (2000) described the soils in Damage Area 2 as Gilman loam exhibiting relatively large sand dunes across the landscape. Site formation processes included aeolian activities and sand dune erosion, resulting in surface artifact concentrations. Phillips (2000) (citing Greenwald et al. [1994]) identified the following soil sequence [REDACTED]. The strata described by that study appear to correlate with the strata of this study as follows:

- Stratum I (0 to 25cm bgs) is a disturbed light brown silt loam (Units 1 of this study).
- Stratum II (25 to 90 cm bgs) is a compact light brown silt loam becoming more calcareous with depth (cultural horizon, containing features identified by Greenwald et al [1994]) (Units 2 to 7 of this study).
- Stratum III (90 to 120 cm bgs) is a lightly compact reddish brown silty clay with caliche accumulation. A burned log identified at a depth of 1 m returned a date of 2455 to 2409 Before Christ (Units 7 and 8 of this study).

B.K. Kearns (geomorphologist) drafted Chapter 5, which discusses the geomorphology of [REDACTED] to the north (in Greenwald et al. 1994). Based on her analysis, Damage Areas 1 and 2 are on an alluvial plain created by the alluvial fans and floodplain of Queen Creek, which creates an interdigitating sequence of fan and alluvium.

Although mapped by previous studies as aeolian deposits within Damage Areas 1 and 2, silt deposits noted in this study appear to contain mica (biotite and muscovite). These thin, micaceous sediments are typically found in water-laid deposits and are winnowed out by wind in aeolian deposits (Compton 1985; Ritter et al 1995). Based on Jacobs' records, Jacobs agrees with the depositional regime Kearns discussed in Greenwald et al. (1994) as a mix of alluvial fan and floodplain deposits.

Based on this geomorphological study, the mechanical excavation of the Damage Area 2 [REDACTED] resulted in the removal of scientifically important paleosols (buried A Horizons) associated with local occupations of the area. The excavation has removed most of the Holocene archaeological record for the portion of [REDACTED] [REDACTED]. Based on this assessment, there is no remaining archaeological potential within the Damage Area 2 [REDACTED].

6.2 In-field Artifact Analysis

The geomorphological assessment field work did not identify isolated artifacts in Damage Area 2. [REDACTED]

[REDACTED] were encountered during the invasive damage assessment field work in Damage Area 2.

7. Cultural Resources Monitoring of Vegetation Stockpile Removal in Damage Area 5

Minor damage occurred in Damage Area 5 while vegetation was being removed over [REDACTED] (Figures 24 to 26). As reported in Powell (2024) and Luhnnow and Powell (2024), the two vegetation stockpiles in Damage Area 5 largely contain vegetation and modern trash. They contain very little soil. As a result, cultural resources monitoring was conducted for the vegetation stockpile removal.

Figure 24. Overview of northwestern vegetation stockpile in Damage Area 5, pre-removal, looking northwest.

FIGURE REDACTED

Figure 25. Overview of Damage Area 5, post-removal, looking northwest.

FIGURE REDACTED

Figure 26. Damage Area 5, showing the location of the vegetation stockpiles and [REDACTED]

FIGURE REDACTED

7.1 Field Methods

Before the vegetation stockpiles were removed, the construction contractor met with the archaeological monitor to clearly describe the removal methods and the necessity of minimizing additional damage to the site. An onsite meeting clearly established the authority of the archaeological monitor to direct construction personnel.

OEA made a slight change in the method for stockpile removal previously described in Luhnnow and Powell (2024). The light nature of the vegetation in the stockpile made it difficult to pick up using a backhoe. Rather, the backhoe was used to slowly push the vegetation to the [REDACTED]. At that point, it was picked up by a skid steer and loaded into a trailer for removal.

Vegetation was removed under the supervision of a qualified archaeological monitor, supervised by a principal investigator who meets the Secretary of Interior's Professional Qualification Standards (36 CFR Part 61; 48 *Federal Register* 44738-44739). The vegetation removal was not subject to screening.

The location of the vegetation removal monitoring was plotted using a Trimble R1 receiver capable of submeter accuracy, photographed, and recorded using standardized forms.

7.2 In-field Artifact Analysis

No isolated artifacts were identified while the vegetation stockpile was removed from Damage Area 5. [REDACTED]

[REDACTED] were encountered during the invasive damage assessment field work in Damage Area 5.

7.3 Disposition of Vegetation

The preference of the Four Southern Tribes was to dispose of the vegetation stockpiles at an approved green waste facility. However, research into facilities of this type revealed that they would only accept “clean” green waste absent of trash. The two vegetation stockpiles at Damage Area 5 did not meet this criterion. As a result, the vegetation was disposed of at a traditional landfill.

8. Research Questions Addressed

Three research topics were evaluated with the isolated artifacts recovered during the screening of the [REDACTED] in Damage Area 1:

1. Chronology
2. Site function
3. Trade and exchange

Artifacts that were identified by the screening and subject to in-field analysis included ceramics, lithics, shell, faunal bone, and historic artifacts. Although these artifacts are out of context, they provide some limited information on activities from the site.

8.1 *Chronology*

The ceramic sherds observed in the [REDACTED] are associated with the Hohokam Preclassic (AD 300 to AD 1150) and Classic (AD 1150 to AD 1350) periods. Although Buff wares were present, they could not be identified to type because of the nondiagnostic elements, degraded paint, and small size. Nonetheless, they are consistent with the previously recorded site assemblage and could be from either the late Preclassic or Early Classic period. Smudging of the interior of vessels is a Classic period trait (Haury 1976). A total of three vessels fragments were smudged: two Salt Plain ware jar sherds and one Salt Plain ware bowl sherd. A Salado Polychrome (Pinto/Gila Polychrome) bowl sherd was also identified. Unfortunately, there was only a hint of black paint on a white background, which is not enough to provide a design element. Polychromes are Classic period ceramics.

8.2 *Site Function*

The ceramic sherds identified in the [REDACTED] are mostly Plain ware ceramics that represent cooking and storage vessels. Indeed, a few of the sherds were sooted, most likely from cooking activities. In general, ceramics that are decorated are often considered to function as serving vessels for food preparation and consumption.

Flaked stone debitage was also identified from the screening and is consistent with the types of materials commonly identified in Hohokam Preclassic and Classic period contexts. Ground stone was also observed, and reflects resource procurement and food preparation activities.

Faunal bone was also identified in the [REDACTED]. These remains were not burned, so it is not possible to confirm their association with a specific cultural context, rather than being incidental to the [REDACTED]. The faunal bone largely represents small rodents and lagomorphs.

8.3 Trade and Exchange

Within the Queen Creek area, evidence of trade from northern Arizona is well-documented.

Cibola and Tusayan trade wares have been identified at [REDACTED] located approximately eight miles northeast of [REDACTED] a Cibola White ware was identified dating to the Preclassic period (Gregory 1984). At [REDACTED] several Tusayan ceramics, including Dogoszhi Black-on-white, Black Mesa Black-on-white, and Sosi Black-on-white, have been identified (Ossa and Gregory 2018). These Tusayan trade wares date from the late Sedentary period to the early Classic period. At [REDACTED] a small Gallup Black-on-white jar fragment was identified in Trench 9. This ceramic is evidence of trade with the Cibola Ancestral Puebloan groups to the north and dates to the early Classic period (circa AD 1030 to AD 1125) (Hays-Gilpin and Hartesveldt 1998). The Gallup Black-on-white ceramic is consistent with other nearby sites that were actively trading with groups to the north during the late Sedentary and Early Classic periods.

In addition, two small fragments of unworked marine shell (*Laevicardium* sp.) were identified in Trenches 10 and 13. *Laevicardium* sp. is known to occur at [REDACTED] as both formal artifacts and unworked shell (Rainey and Stubing 2022). This is evidence of the occupants of the site participating in the Gulf of California trade network.

9. Agreements and Curation

Per Luhnnow and Powell (2024), the following agreements, permits, and other field measures were implemented during the invasive damage assessment field work:

- Maricopa County Dust Control Permit
- Arizona Blue Stake
- Burrowing Owl Survey
- Notification to the U.S. Air Force, [REDACTED] plotted in the Damage Area 1 [REDACTED].

9.1 [REDACTED] Agreement

A project [REDACTED] agreement (Case No. 2024-065) was issued for the project by ASM under ARS § 41-865.

[REDACTED]

9.2 Curation

On August 22, 2024, the Huhugam Heritage Center issued a curation agreement for the curation of all documents, field notes, and photos resulting from the invasive damage assessment field work.

10. Reporting

This Invasive Damage Assessment Technical Report (Technical Report) is provided to the consulting parties for a 30-day review and comment period. Any comments received will be addressed in a revised Technical Report, to be issued within 15 calendar days of the close of the review and comment period.

If requested, following the distribution of the Technical Report, OEA will host a virtual consulting party meeting to address any questions regarding the invasive damage assessment and to provide a discussion forum for the consulting parties. OEA will also continue its Tribal consultation efforts with a separate government-to-government meeting specifically for the Four Southern Tribes and, if requested, additional separate government-to-government meetings with other interested Native American Tribes. Information shared from these meetings will be incorporated into the revised Technical Report.

11. Ongoing Consultation

OEA remains committed to continuing consultation with the project's consulting parties throughout the invasive damage assessment process. Ongoing consultation and communication is anticipated to consist of:

- Hosting an in-person field visit during the field work with the consulting parties as a group (this took place September 11, 2024)
- Hosting a separate, in-person field visit during the field work specifically for the Four Southern Tribes (this took place September 10, 2024)
- Distributing the technical report for consulting party review and comment
- Attending Four Southern Tribes Cultural Resource Working Group session(s) in person to present and discuss the damage assessment
- Holding virtual consultation meetings with the consulting parties as a group to discuss the invasive damage assessment and to disclose any additional information gathered during the Board's deliberative process
- Holding individual, government-to-government meetings specifically with the Four Southern Tribes
- Holding individual government-to-government meetings with other Native American Tribes, as requested

12. Summary and Recommendations

This report provides the result of invasive damage assessment field work at within three damage areas for the UP PIRATE project. The field work was guided by an approved invasive damage assessment work plan (Luhnow and Powell 2024). Three activities occurred during the field work within Damage Areas 1, 2, and 5 within [REDACTED]

- Geomorphological trenching and profiling to assess the remaining archaeological potential [REDACTED] in Damage Areas 1 and 2
- Sample screening of a large [REDACTED] in Damage Area 1 to assess whether [REDACTED] were present and to inform on the ultimate origin of the [REDACTED]
- Monitoring the removal of vegetation stockpiles from the surface of the site in Damage Area 5

Geomorphological investigations in Damage Areas 1 and 2 consisted of the profiling of three mechanically excavated trenches in [REDACTED] and the [REDACTED] to determine the stratigraphic sequence relative to previously recorded cultural horizons (Greenwald et al. 1994; Hackbarth and Craig 2004; Hart and Craig 2003, 2006; Phillips 2000). The result of the geomorphological assessment indicates that within the [REDACTED] in Damage Areas 1 and 2, the construction and excavation activities have removed scientifically important paleosols (buried A Horizons) associated with local occupations of the area. Within Damage Area 1, the construction and excavation activities also removed known archaeological features identified by Hackbarth and Craig (2004). Based on the geomorphological assessment, there is no remaining archaeological potential within the Damage Area 1 and 2 [REDACTED].

Sample screening of the Damage Area 1 [REDACTED] consisted of the mechanical excavation of eight trenches within the [REDACTED]. The trenches were systematically placed across the [REDACTED] and resulted in a 2% sample of the materials. Spoils from each trench were segregated and screened through 1/4-inch mesh. The screening identified 78 individual precontact artifacts, consisting of ceramics, flaked stone, shell, and ground stone. Eight pieces of faunal bone and three historic artifacts were also identified. The [REDACTED] also contained modern construction debris. [REDACTED] were encountered.

The screening results indicate the [REDACTED] consists of unconsolidated fill, with a sparse count of precontact artifacts mixed with modern construction debris. Based on these results, the [REDACTED] likely contains soil derived from [REDACTED] but from outside the UP ROW. However, based on the limited number of artifacts found during screening compared to the density of artifacts observed on the previously intact surface [REDACTED]. The origin of the [REDACTED] remains unknown, as does the ultimate disposition of the material removed from the Damage Area 1 [REDACTED]

A qualified archaeologist monitored the vegetation stockpiles' removal from Damage Area 5. OEA made a slight change in the method for stockpile removal previously described in Luhnnow and Powell (2024). The light nature of the vegetation in the vegetation stockpile made it difficult to pick up using a backhoe. Instead, the backhoe was used to slowly push the [REDACTED]

[REDACTED] From there, it was picked up by a skid steer and loaded into a trailer for removal. No additional site damage occurred as a result of this change.

Based on the results of the invasive damage assessment field work, major damage occurred to [REDACTED] as a result of construction activities in Damage Areas 1 and 2. Known archaeological features and all potential culture-bearing archaeological deposits were removed in the Damage Area 1 [REDACTED] as a result of its construction. All potential culture-bearing archaeological deposits were removed in the Damage Area 2 [REDACTED] as a result of its construction [REDACTED]

[REDACTED]. However, because the material present is likely not derived from the Damage Area 1 [REDACTED], it is not possible to definitively address whether [REDACTED]

[REDACTED] were disturbed as a result of the construction of the [REDACTED]

Based on the results of the invasive damage assessment monitoring, minor damage occurred to [REDACTED] as a result of the vegetation clearing and stockpiling in Damage Area 5.

The O'Odham community has stated that they have suffered intangible cultural damage to their heritage and traditional values as a result of this ground disturbance.

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Appendix A

Cultural Resources Map

FIGURE REDACTED

FIGURE REDACTED

Appendix B

Civil Survey of [REDACTED]

FIGURES REDACTED

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