



GROUNDSTONE LANDSCAPE AT LUKE AIR FORCE BASE: A FOUR-DIMENSIONAL APPROACH

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INTRODUCTION & LOCATION



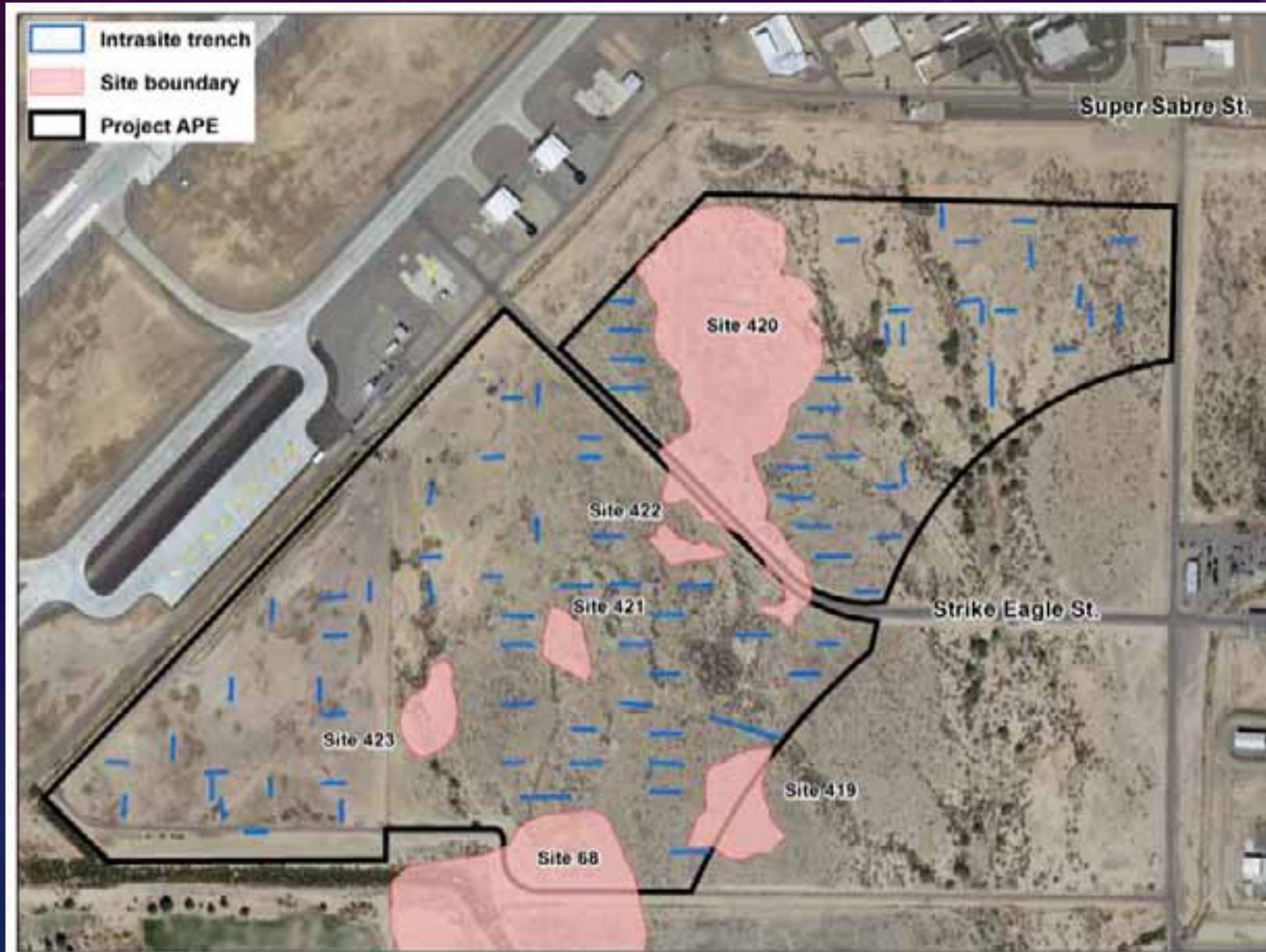
PROJECT OVERVIEW

- Luke Air Force Base (LAFB), in partnership with Arizona Public Service Company, plans to construct a 17-megawatt solar-power array on an undeveloped portion of the base in order to comply Renewable Energy Standard. This standard requires 15% of all the state of AZ utilities come from renewable sources by 2025.
- The LAFB Solar-Power Array Archaeological Data Recovery Project (Luke Solar project) area of potential effects (APE) is a 107-acre parcel located south of Super Sabre Street and southeast of the LAFB flight line. The APE is divided by Strike Eagle Street; the 42-acre portion north of Strike Eagle Street is designated Area A, and the 65-acre portion south of Strike Eagle Street is designated Area B (see Figure 1.1).
- Statistical Research, Inc.(SRI), was contracted in November 2010 to conduct the archaeological mitigation for the Luke Solar project.

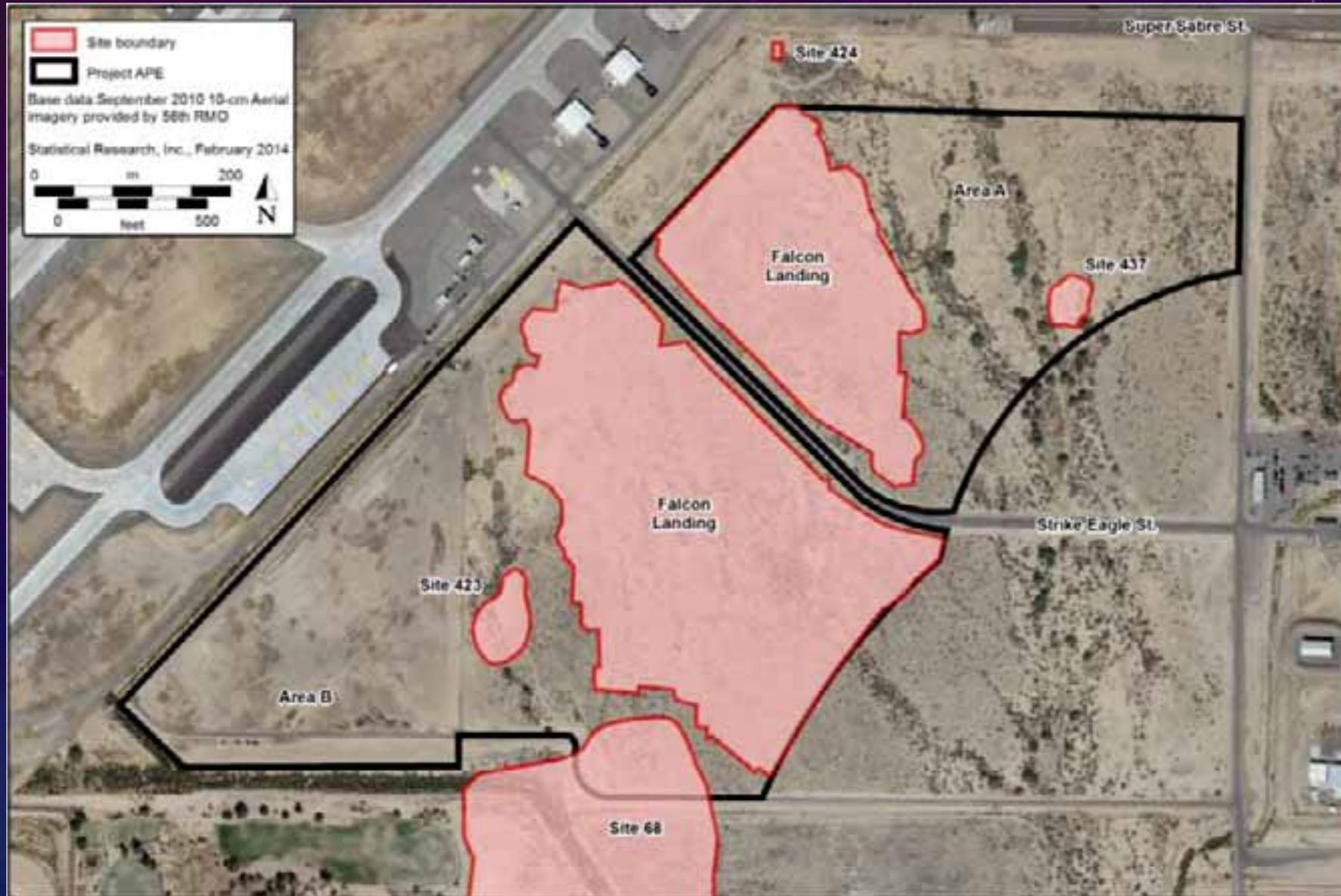
PROJECT OVERVIEW

- **Phase 1:** Between November 3 and December 2, 2010, SRI conducted archaeological investigations in the Luke Solar project area.
- **Intersite Testing:** An additional intersite-testing program for the areas between previously defined archaeological site boundaries within the project APE was conducted between May 23 and June 9, 2011.
- **Phase 2.1:** On September 19, 2011, SRI began data recovery on the Luke Solar project. The data recovery phase consisted of mechanical stripping and intensive feature excavation.
- **Phase 2.2:** SRI resumed data recovery efforts on November 5, 2012, as a sub-consultant to Aerostar Environmental Services, Inc. (Aerostar), and that work concluded on April 25, 2013.

PROJECT OVERVIEW



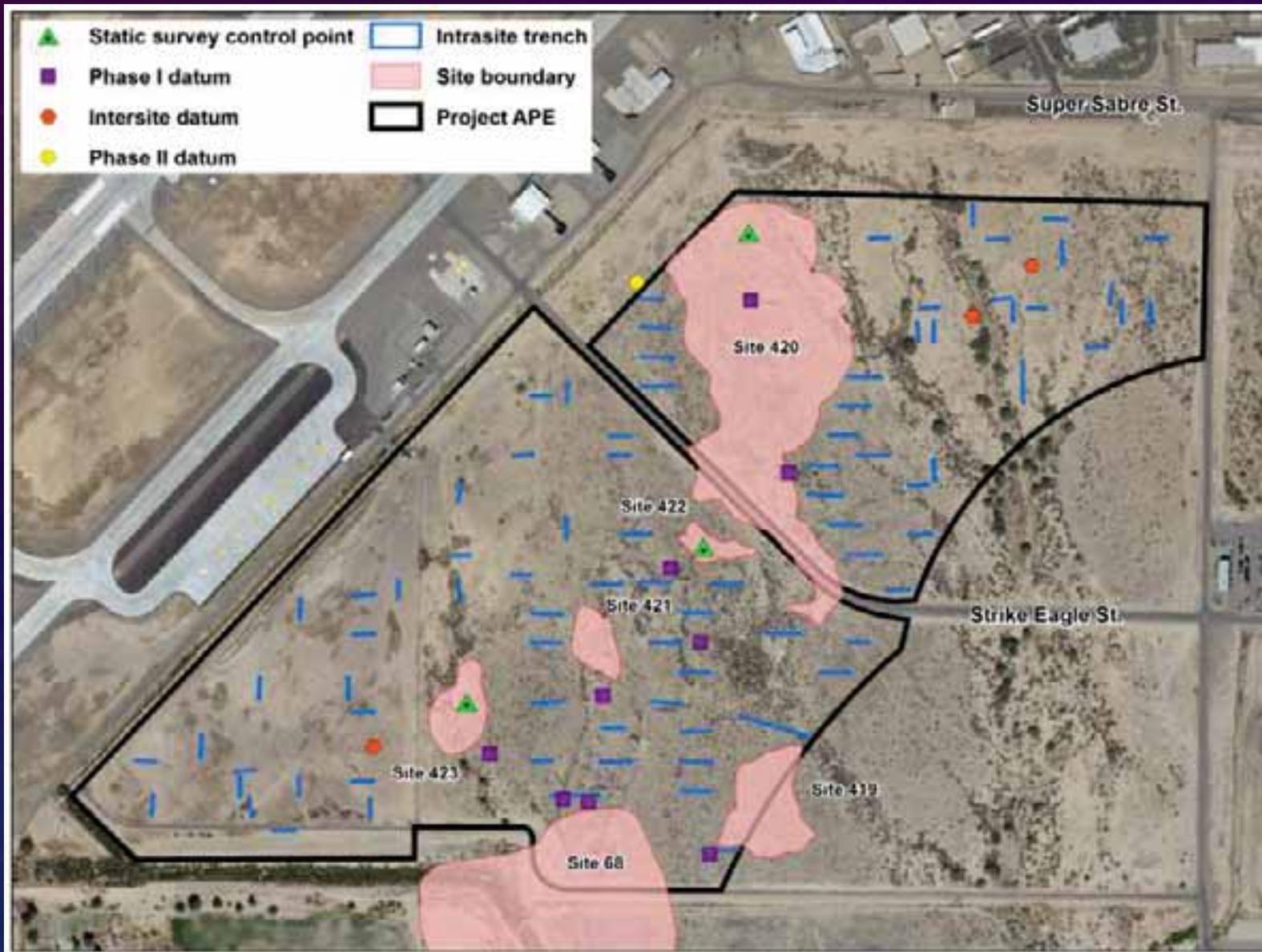
PROJECT OVERVIEW



FIELD MAPPING

- SRI's Department of Cartography and Geospatial Technologies (CAGST) was responsible for maintaining control and documentation of spatial locations for all archaeological fieldwork activities.
- At the beginning of the project, three control points were established by a static Global Positioning System (GPS) survey with an Ashtech ProMark2 L1 antenna.
- Throughout the project, these three control points were used to establish additional datums within the project area.
- Once control was established, all spatial data for each site were acquired with a Sokkia Set 5 total station, using a Panasonic Toughbook laptop computer and PenMap software.
- Over 44,000 points were shot throughout the project.
- 427 extramural ground stones were point located, and over 5000 features were mapped.

FIELD MAPPING



FIELD MAPPING



MECHANICAL STRIPPING

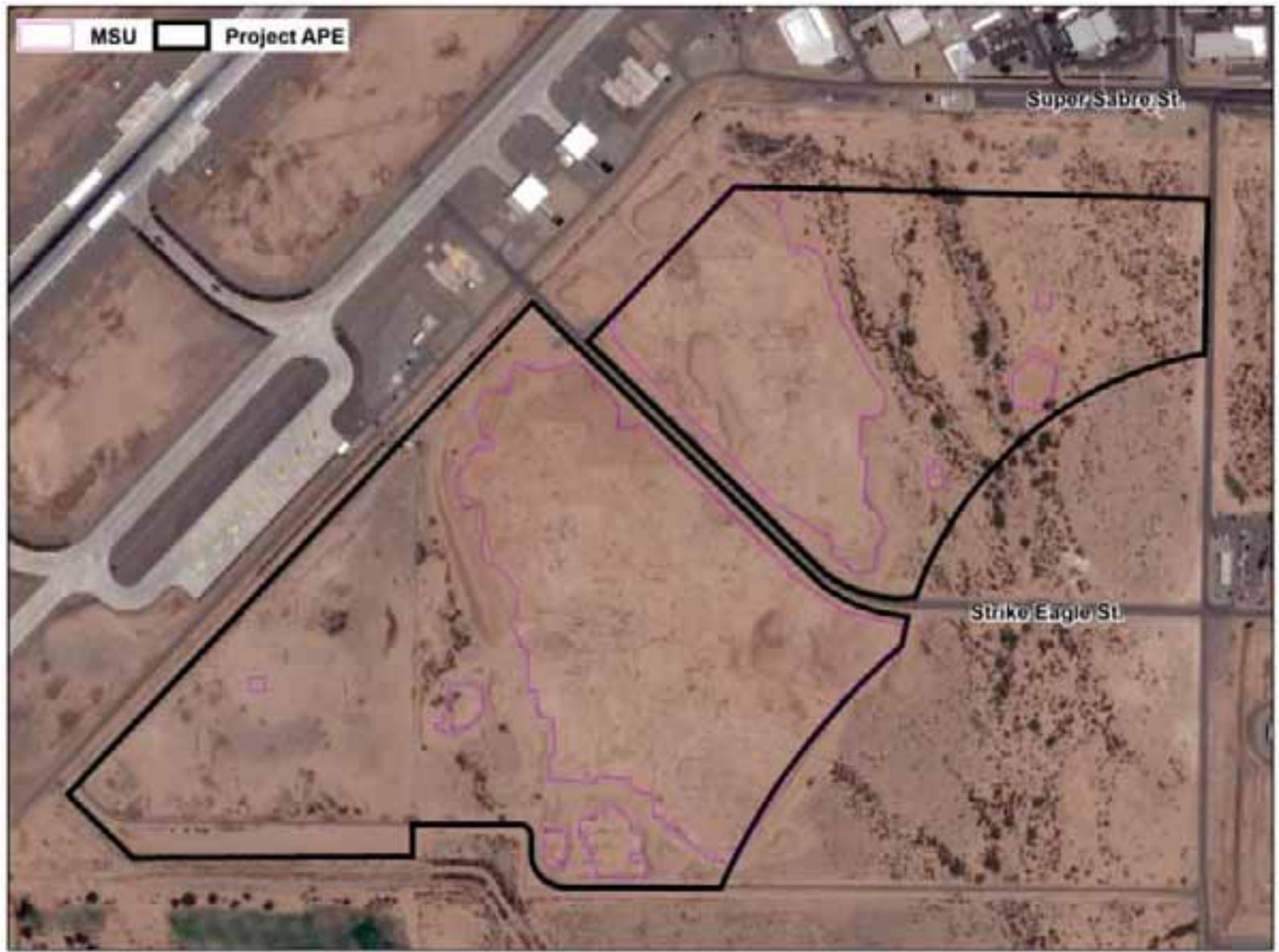
The site sediments were mechanically stripped with a trackhoe until cultural material or sterile sediments were encountered. This process took a total of 22 weeks to complete and involved two 325 Series trackhoes, two 550 Series front-end loaders, and three water trucks. Dust control and stormwater pollution prevention requirements were significant logistical challenges.



MECHANICAL STRIPPING



MECHANICAL STRIPPING



MECHANICAL STRIPPING

During mechanical stripping of 42 acres, 427 complete ground stone tools, like this mortar, were found and recorded in extramural contexts.



MECHANICAL STRIPPING

Some artifacts were pedestaled with the trackhoe, and the surrounding area was excavated to a lower depth to identify additional features and artifacts.



RECOVERY CONTEXTS

Ground stone artifacts in place on the stripping surface. The Falcon Landing site contained a rarely preserved "landscape" of Middle and Late Archaic period ground stone tools.

Features and artifacts representing thousands of years of occupation were contained within only about half a meter of deposition.



STRATIGRAPHIC UNIT AGES

Stratigraphic Unit	Date Range	Temporal Component
I	7040–5320 cal B.C.	
II	2970–2730 cal B.C.	Chiricahua
IIA	2810–2420 cal B.C.	Chiricahua
IIA/II s/sf	2810–790 cal B.C.	Chiricahua
II s/sf	2570–790 cal B.C.	Chiricahua
II s/sf /III1	2570–920 cal B.C.	Chiricahua
III1	1380–920 cal B.C.	Chiricahua/ San Pedro transition , San Pedro
III1/III2	1380–200 cal B.C.	San Pedro, San Pedro/ Cienega Transition, Cienega
III2	720–200 cal B.C.	Cienega
III2/IV	720 cal B.C.–cal A.D. 1220	Cienega/Classic period
III2cf	160 cal B.C.–cal A.D. 340	Cienega/Red Mountain transition
III2cf/IV	160 cal B.C. –cal A.D. 1220	Cienega/Classic period
IV	cal A.D. 610–1220	pre-Classic Classic
V	cal A.D. 1520–1800	Protohistoric Historic

RESULTS AND CONCLUSIONS

- The hot spot analysis works by looking at each ground stone artifact within the spatial context of neighboring ones.
- To be a statistically significant hot spot, a ground stone artifact should have high value in weight and also be surrounded by similarly weighted ground stone artifacts.
- Our analysis indicates that extramural ground stone found on the surfaces of stratigraphic Units I and II is significantly heavier and more concentrated compared to other stratigraphic unit surface (e.g., Unit IV).

ACKNOWLEDGEMENTS

