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Project name:
Roverscape Freezer Project

Project reference:
60689157

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Date:
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Memo

Subject: Section 106 Consultation on Roverscape Freezer Project,
NASA Ames Campus, Moffett Field, Santa Clara County, California

1. Introduction

The National Aeronautics and Space Administration (NASA) Ames Research Center (ARC) proposes the Roverscape Freezer Project (project or undertaking) at ARC, Moffett Field, Santa Clara County, California. As the lead federal agency, NASA is responsible for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (54 United States Code 300101 et seq.), which requires federal agencies to take into account the effects of their activities and programs on historic properties, and its implementing regulations in 36 Code of Federal Regulations (CFR) Part 800. The purpose of this memorandum is to provide necessary information for compliance with Section 106, including a description of the undertaking and the Area of Potential Effects (APE), the methodology used to identify and evaluate historic properties within the APE, a description of the affected historic properties, and an assessment of potential effects resulting from the undertaking.

1.1 Project Location

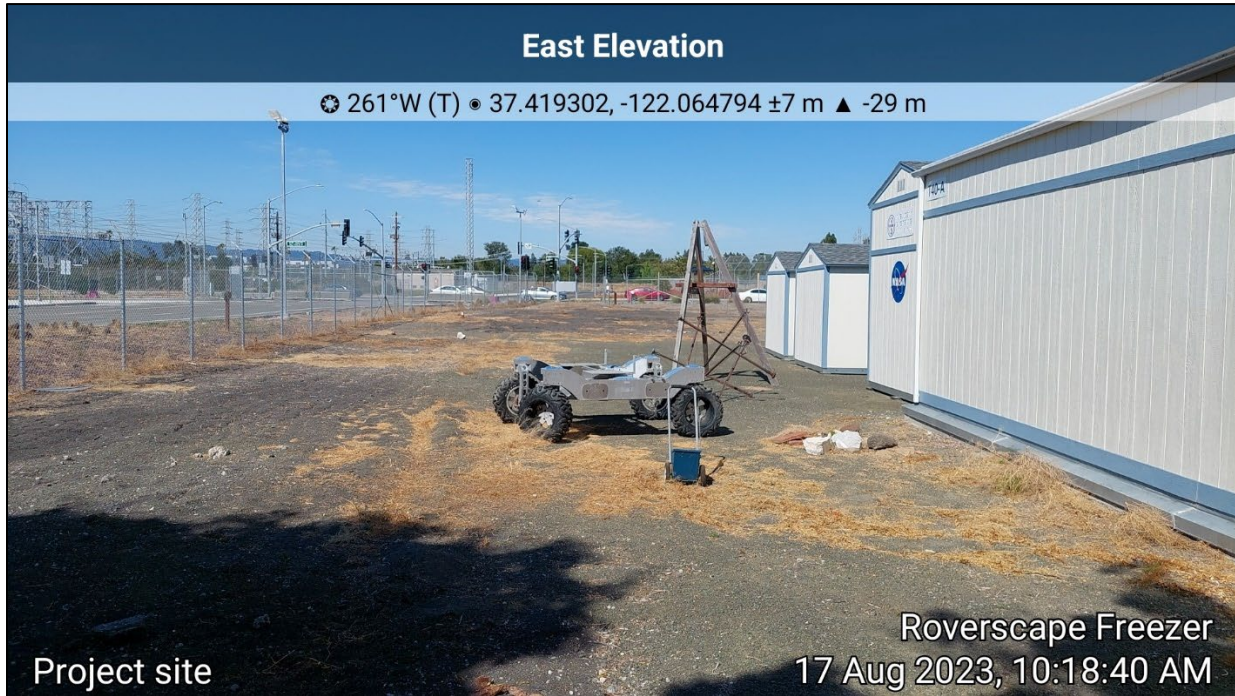
The project is located within the NASA Ames Campus at ARC, Moffett Field, Santa Clara County, California (**Appendix A; Figures 1 and 2**). The project is limited to exterior improvements directly adjacent to existing Building T40-A, a modern modular portable structure (trailer) that is less than 50 years old, will not be impacted by the project, and was not evaluated for the purposes of this undertaking. The remainder of the area surrounding the proposed undertaking is largely undeveloped space, used for parking and testing of lunar rovers.

1.2 Project Personnel

This study was conducted by cultural resources professionals who meet the Secretary of the Interior's Professional Qualifications Standards (48 Federal Register 44738). Jay Rehor, M.A., RPA, served as the Principal Investigator; Alec Stevenson provided mapping; and Trina Meiser, M.A., served as the lead verifier of this document.

2. Description of the Undertaking

This project involves the construction of a small (approximately 4' diameter) subsurface liquid nitrogen freezer assembly that will be used to freeze soil to test the drilling capabilities of lunar rovers, and will be located directly south of existing Building T40-A (**Photograph 1**). No alterations to existing structures are proposed. The freezer assembly will be connected to liquid nitrogen tanks, electricity, and a vent pipe.



Photograph 1. Building T40-A (right foreground) , south elevation (view facing west) where Roverscape freezer will be constructed

A 10' long by 5' wide by 1' thick concrete pad will be constructed at the southwest corner of existing building T40-A, to house liquid nitrogen tanks for the operation of the Roverscape freezer. A precast concrete trench will extend south from the pad and building T40-A, to provide liquid nitrogen and electricity to the subsurface freezer assembly. The trench will be excavated approximately 17' long by 2.5' wide, and extend up to 2' deep, including imported base gravel to support the precast concrete trench. The subsurface freezer will consist of a preconstructed assembly installed in an approximately 4' diameter hole, which will be excavated a maximum of approximately 3.5' deep. A breather pipe and vent cap will be installed to vent the freezer assembly. The pipe will be installed in an approximately 13' long by 6" wide by 2' deep trench extending south from the freezer assembly. (**Appendix B – Select Project Drawings**).

3. Area of Potential Effects

The APE is defined to address both direct and indirect impacts on historic properties. The APE encompasses areas that may be affected by both temporary and permanent construction activities (see **Appendix A; Figure 3**). All project activities will occur in a currently undeveloped area directly south of Building T40-A. Below-grade activities include limited grading for the tank slab, installation of the precast conduit trench, the subsurface freezer assembly, and breather/vent pipe. These areas are included in the APE for direct impacts, with a vertical APE of approximately 4' maximum depth. Visual impacts resulting from the new construction pose no impacts to the setting of potential nearby historic properties due to the fact that the majority of installations will be subsurface—aside from the above-ground nitrogen tanks—and the fact that no potentially historic-era built

environment elements are located within the viewshed of the proposed project; therefore, the APE is limited to the specific areas where project activities will occur (i.e., area of direct impacts).

4. Identification of Historic Properties

Historic properties are defined as any district, site, building, structure, or object that is included in or is eligible for listing in the National Register of Historic Places (NRHP). The following sections address the methodology and efforts to identify historic properties in the APE.

4.1 Archaeological Resources

The land that comprises ARC has changed dramatically since the early twentieth century from predominantly agricultural use to a military airfield installation beginning in 1931 and aeronautical research and development beginning in 1939. Extensive surface disturbance occurred throughout ARC with grading and fill to create the airfield and the campuses with hundreds of buildings and structures to support operations.

A comprehensive investigation of previous archaeological studies at ARC was completed in 2017 (AECOM 2017). This investigation involved a desktop survey of archival resources and a geoarchaeological assessment of the entire ARC site and included an assessment of archaeological sensitivity and the potential for buried archaeological resources. In a letter dated June 22, 2017, the State Historic Preservation Officer (SHPO) found the study results acceptable as a baseline for future investigation and treatment of archaeological resources at ARC and as a reference for professionally qualified staff for future undertakings (NASA_2015_0928_001). The study identified areas of heightened prehistoric and historic-period archaeological sensitivity and also concluded that there is low potential for more deeply buried prehistoric archaeological resources across ARC.

A review of the 2017 investigation indicates that the proposed work is in an area of low archaeological sensitivity and was not identified as sensitive for either prehistoric or historic-period resources.

Given the relatively undeveloped nature of the Roverscape area compared to surrounding portions of the ARC, and the exposed native ground surface in the project area, it was determined that there was a potential for archaeological resources, associated with the previously documented precontact and historic-era resources described above, or previously unrecorded archaeological resources, to be present within the project area. As such, an archaeological field study, including survey and limited subsurface hand auger testing, was undertaken.

AECOM Senior Archaeologist, Jay Rehor, conducted a site visit on August 17, 2023. All exposed ground surface was inspected for evidence of archaeological resources. Although the northern portion of the Roverscape parcel is covered with imported gravels, the southern portion of the Roverscape, including the current APE, consists primarily of native soils exposed at the surface. Surface soils are mapped as Hangerone complex series soils (Soil Survey Staff 2023). Hangerone series soils are organic-rich clay soils formed in poorly drained basin environments with high calcium carbonate accumulation (NRCS 2016). The typical soil profile description for the Hangerone series includes a buried soil (paleosol) between 6 and 7.5 feet (1.8 to 2.3 m) below surface. Geoarchaeological investigations in the vicinity of ARC, which include subsurface trenching and continuous Geoprobe coring, identified paleosols within areas mapped as Hangerone and associated soil series (URS 2014, 2013).

No evidence of archaeological resources were observed during the pedestrian surface survey. In order to address the potential for buried archaeological resources, not visible at the surface, three hand augers were excavated within the APE for the undertaking. The hand augers consisted of a 3.5" (approximately 9 centimeter[cm]) diameter bucket excavated to approximately 4.25' (130 cm) below surface. All excavated soils were screened through 0.25-inch wire mesh. No evidence of archaeological resources was encountered in any of the auger units.

The subsurface soil profile of each of the three auger units were identical, and consistent with hydric Hangerone series soils; though no evidence of a paleosol was observed. The subsurface profile consisted of the following:

Horizon	Horizon Depth (cm)	Horizon Description	Notes
Ap	0-20	Black (10YR 2/1) silty clay with very strong medium angular blocky structure, mixed with imported angular gravels, with a clear lower contact.	Disturbed native sediment mixed with imported greenish grey loam and angular gravels
AB	20-100	Black (10YR 2/1) silty clay to sandy clay with 10% gravels, very strong medium to coarse angular blocky structure, and common distinct clay films on ped faces, pores, and bridging colloids; diffuse lower contact.	Intact native organic-rich hydric surface soil
BC	100-120	Very dark grey (10YR 3/1) sandy clay with 10% gravels, massive to fine subangular blocky structure, and few faint clay films on ped faces and pores; clear lower contact.	Decreased organic content and structure
BCK	120-? (augers terminated @ 130)	Light grey (10YR 3/1) silty clay with less than 10% gravels, massive to very fine subangular blocky structure, and few faint clay films on ped faces; highly reactive with CaCO3 present throughout.	Similar to above horizon but with precipitated calcium carbonate present throughout (resulting in much lighter color)



Photograph 2. Overview of Auger #1, completed (view to west)

4.2 Architectural Resources

This study identified one building, Building T40-A, in the APE (Table 1).

Table 1. Architectural Resources in the APE

Resource	Date	Eligibility Status	Effects Analysis
Building T40-A – Storage	2013	Not eligible	No Historic Properties Affected

Building T40-A is a small modular prefabricated building (along with three associated smaller and similar storage sheds) located approximately 60 feet north of Hunskar Road, within the largely undeveloped Roverscape Robotics Research Development and Test Facility. Given its age and utilitarian prefabricated construction, the building does not have any historical or architectural significance and is not eligible for the NRHP.

5. Affected Historic Properties

No known archaeological sites are in the APE; and Building T40-A is not eligible for the NRHP. No historic properties were identified in the APE.

6. Assessment of Effects

Per 36 CFR § 800.5(a)(1), an adverse effect results when an undertaking may alter, either directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the historic property's integrity.

There are no known archaeological sites in the APE, and no potential archaeological resources were identified during a field survey of the project area and subsurface testing within the project footprint. Ground disturbance for the undertaking would be limited. Due to the proposed scope and lack of archaeological sensitivity, no archaeological historic properties would be affected by the undertaking.

No known historic properties are located in the APE. Therefore, the undertaking would result in no historic properties affected.

7. Summary of Findings

The proposed undertaking would not alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP. Therefore, a finding of No Historic Properties Affected per 36 CFR § 800.4(d)(1) would be appropriate for this undertaking.

8. References

- AECOM. 2014. *Integrated Cultural Resources Management Plan for NASA Ames Research Center, Moffett Field, California*. Accessible online at https://historicproperties.arc.nasa.gov/downloads/icrmp_nasa_arc_all.pdf.
- AECOM. 2017. *NASA Ames Research Center Archaeological Resources Study*. Accessible online (redacted) at https://historicproperties.arc.nasa.gov/downloads/section106_achaeology_20170224_nasa_att.pdf.
- Kovar, Kathleen. 1995. Site Record Form Update for CA-SCL-23. On file at the Northwest Information Center, Sonoma State University, California.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Web Soil Survey*. Available online at the following link: <http://websoilsurvey.sc.egov.usda.gov/>. Accessed August 23, 2023.

Appendices

Appendix A: Figures 1–3 (Project Location, Project Site, and APE)

Appendix B: Select Project Drawings

Appendix A – Figures

The following content was redacted from this public posting:

Figure 2. Project Vicinity Map

Figure 3. APE Map

Appendix B. Select Project Plans