Federal Aviation Administration

Draft

Environmental Assessment for Reentry, Landing, and Recovery Operations of a Varda Space Industries Capsule within Utah Test and Training Range (UTTR) South or Northern Dugway Proving Ground (DPG), Utah

March 2023

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Draft Environmental Assessment for the Reentry, Landing, and Recovery Operations of a Varda Space Industries Capsule within Utah Test and Training Range South or Northern Dugway Proving Ground

AGENCIES: Federal Aviation Administration (FAA), lead federal agency; the U.S. Department of the Air Force, cooperating agency.

DEPARTMENT OF TRANSPORTATION, FEDERAL AVIATION ADMINISTRATION: The FAA is evaluating potential environmental impacts of Varda Space Industries, Inc.'s (Varda) proposal to conduct reentry, landing, and recovery (RLR) operations of Varda's capsule within Utah Test and Training Range (UTTR) South or Northern Dugway Proving Ground (DPG). Under the Federal Action, the FAA would 1) issue a vehicle operator license to Varda to conduct RLR operations within UTTR South and Northern DPG, and 2) issue Letter(s) of Agreement to Varda and the U.S. Department of the Air Force to outline notification procedures prior to, during, and after an operation and procedures for issuing a Notice to Air Missions.

The FAA is releasing this Environmental Assessment (EA) for public review pursuant to section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code (U.S.C.) 4321, et seq.), Council on Environmental Quality NEPA-implementing regulations (40 Code of Federal Regulations Parts 1500 to 1508), Section 106 of the National Historic Preservation Act (16 U.S.C. § 470), and FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*.

PUBLIC REVIEW PROCESS: In accordance with the applicable requirements, the FAA will release the Draft EA for a 30-day public review. Comments are due on April 27, 2023. The FAA provided a public notice of the availability of the Draft EA for public review and comment through local newspaper advertisement. An electronic version of the Draft EA will be available on the FAA's website at https://www.faa.gov/space/environmental/nepa_docs.

CONTACT INFORMATION: Questions regarding this Draft EA can be addressed to Eva Long, Environmental Protection Specialist, "Varda UTTR, c/o ICF", 1902 Reston Metro Plaza, Reston, VA, 20190. Comments may also be submitted by email to VardaUTTR@icf.com.

This EA becomes a Federal document when evaluated, signed, and dated by the responsible FAA Official.

Responsible FAA Official: STACEY MOLINICH ZEE Digitally signed by STACEY MOLINICH ZEE Date: 2023.03.28 13:53:38 -04'00' Date: _____

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Acronyms & Abbreviations

ACHP	Advisory Council on Historic Preservation
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AGL	above ground level
AHA	aircraft hazard area
APE	Area of Potential Effect
ATC	Air Traffic Control
ATO	Air Traffic Organization
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CDNL	C-weighted DNL
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DAF	U.S. Department of the Air Force
dB	decibel(s)
DNL	day-night average sound level
DoD	Department of Defense
DOT	U.S. Department of Transportation
DPG	Dugway Proving Ground
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
ft	foot/feet
ft^2	square foot/feet
GHG	greenhouse gas
lbs	pounds
IFR	instrument flight rules
LOA	Letter of Agreement
L_{pk}	peak sound level
MBTA	Migratory Bird Treaty Act
mi^2	square mile(s)
MOA	Military Operations Area
MSL	above mean sea level
MT	metric ton(s)
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOTAM	Notice to Air Missions
NO_2	nitrogen dioxide
NOx	nitrogen oxides
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
OSIRIS-Rex	Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer
PA	Programmatic Agreement
$PM_{2.5}$	particulate matter ≤2.5 microns in diameter
PM_{10}	particulate matter ≤10 microns in diameter
psf	pounds per square foot
R-	Restricted Airspace
RA	Restricted Area
RLR	reentry, landing, and recovery
ROI	region of influence
RONA	Record of Non-Applicability
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SUA	Special Use Airspace
UDWR	Utah Division of Wildlife Resources
U.S.	United States
U.S.C	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UTTR	Utah Test and Training Range
Varda	Varda Space Industries, Inc.
VFR	visual flight rules

Chapter 1. Purpose of and Need for the Proposed Action

1.1 INTRODUCTION

The Federal Aviation Administration (FAA) is currently evaluating a proposal by Varda Space Industries, Inc. (Varda) to conduct reentry, landing, and recovery (RLR) operations of a small (approximately 3-foot [ft] diameter) aluminum capsule within the United States (U.S.) Department of the Air Force's (DAF) Utah Test and Training Range (UTTR) South and U.S. Department of the Army's Dugway Proving Ground (DPG) located in Tooele County, Utah. As authorized by Chapter 509 of Title 51 of the U.S. Code (U.S.C.), the FAA is to "*oversee and coordinate the conduct of commercial launch and reentry operations, issue permits and commercial licenses and transfer commercial licenses authorizing those operations, and protect the public health and safety, safety of property, and national security and foreign policy interests of the United States; and to facilitate the strengthening and expansion of the United States space transportation infrastructure, including the enhancement of United States launch sites and launch-site support facilities, and development of reentry sites, with Government, State, and private sector involvement, to support the full range of United States space-related activities*."

To conduct the proposed RLR operations, Varda must obtain a vehicle operator license from the FAA's Office of Commercial Space Transportation for reentries pursuant to 14 Code of Federal Regulations (CFR) Part 450, *Launch and Reentry License Requirements*. Issuing launch licenses is considered a major federal action subject to environmental review under the National Environmental Policy Act (NEPA), as amended (42 U.S.C. 4321 *et seq*.). The FAA is the lead federal agency and is preparing this Environmental Assessment (EA) in accordance with NEPA, Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. These regulations require a lead agency to prepare or supervise preparation of an EA for a federal action (including an action occurring on federal property) that does not qualify for a categorical exclusion or may not require preparation of an Environmental Impact Statement (EIS). A Finding of No Significant Impact (FONSI) will be issued if, as a result of this EA, the environmental impacts of implementing the Proposed Action are determined to be not significant. If a FONSI cannot be issued, the lead agency would publish a Notice of Intent to prepare an EIS.

This EA evaluates the potential environmental impacts of activities associated with the Proposed Action of issuing a vehicle operator license to Varda (see Section 2.1 for more details). The completion of the environmental review process does not guarantee that the FAA will issue a license to Varda for RLR operations at UTTR South or northern DPG. Varda's license application must also meet FAA safety, risk, and financial responsibility requirements (14 CFR Part 400).

Under the Proposed Action, no construction activities would occur and there would be no change to existing infrastructure at UTTR South or DPG. Alternative landing areas that were considered but dismissed are discussed in Section 2.2. Varda would launch the capsule into low Earth orbit on a SpaceX Falcon 9 rocket from Vandenberg Space Force Base (SFB), California or from Cape Canaveral Space Force Station (CCSFS), Florida. Impacts associated with Falcon 9 launches at Vandenberg SFB and CCSFS have been addressed within the launch licensing and environmental review processes conducted by the FAA for SpaceX standard rideshare missions (30th Space Wing 2018; FAA 2020a) and therefore are not addressed in this EA.

The FAA is the lead agency for the preparation and coordination of this EA (40 CFR § 1501.7), and the DAF is a cooperating agency (40 CFR § 1501.8). Additional details are contained in Section 1.4, *Federal Agency Roles*.

1.2 PURPOSE AND NEED

Over the last few decades, the International Space Station has proven that certain products manufactured in space are significantly better than their Earth-based equivalent; and bring significant benefits to life on Earth. This includes pharmaceutical drugs for cancer, next generation fiber optics, and advanced semi-conductors. Progressing in-orbit manufacturing technology and commoditizing the market will bring vast benefits to humanity and ensure that the U.S. maintains its position as the world's economic leader for decades to come.

To commercialize space manufacturing, the commercial space industry needs cost-efficient logistics both to and from space. To fulfill its needs and that of the broader community, Varda has developed a scalable, cost-effective reentry capsule that can safely land terrestrially. This allows more frequent, and flexibility of, payload returns. Currently return capabilities are limited to costly human-rated vehicles. This significantly limits the types and frequency of activities that can be conducted in orbit, putting the U.S. at a costly competitive disadvantage, and reduces the schedule flexibility of reentry.

Varda's economical dual-use (commercial/government) reentry capsule systems are capable of hypersonic (Mach 25+) flight in support of Department of Defense (DoD) missions critical to national security. Varda is currently working with the DAF and U.S. Department of the Navy to support their Intercontinental Ballistic Missile (ICBM) and hypersonic weapons development. The reentry and hypersonic weapons development communities have lacked accessible flight-testing capabilities, leading to significant schedule challenges and failed testing. In addition, during the first reentry operation, Varda would be testing a new thermal protective shield material in cooperation with the National Aeronautics and Space Administration (NASA).

The purpose of the Proposed Action is to implement a series of capsule return test missions to assess processes for manufacturing products in space that require zero-gravity to fabricate and return those products to Earth using a small aluminum return capsule. In addition, Varda's capsule reentry operations would support the DoD's reentry and hypersonic weapons research by providing data on reentry trajectories and associated hypersonic flows and subjecting components (e.g., sensors, navigation systems, and other subsystems) and materials to hypersonic environments. The Varda test capsule and reentry operations supports the DoD's need to conduct hypersonic operations within representative flight environments at low cost, with high launch and return rates, and within a DoD-controlled test range with sufficient airspace and land area to safely and securely accommodate the proposed RLR operations of the Varda capsule, and that has previously supported similar recovery operations.

1.3 LOCATION OF THE PROPOSED ACTION

1.3.1 U.S. Department of the Air Force Utah Test and Training Range (UTTR)

UTTR is located in northwestern Utah and eastern Nevada, approximately 60 miles west of Salt Lake City (Figure 1.3-1). The UTTR is divided into the North Range (368,875 acres) and the South Range (589,775 acres). The site is administered and maintained by Headquarters UTTR stationed at Hill Air Force Base (AFB). The UTTR is a DoD Major Range and Test Facility Base and provides an ideal location for operational test and evaluation for weapons requiring a large safety footprint. UTTR is used for air-to-air-combat and air-to-ground inert and live practice bombing and gunnery training by DoD aircrews. The UTTR contains the largest block of overland contiguous special use airspace within the continental U.S. including 6,010 square nautical miles of restricted airspace (Figure 1.3-2). The airspace is situated over 2.3 million acres of DoD land, of which 958,650 acres are owned and managed by the DAF (UTTR North and South) and 801,505 acres are owned and managed by the U.S. Army (DPG). UTTR's large airspace, exceptionally long supersonic corridors, large safety footprint area, and remote location make it an invaluable national asset in terms of both its training and test mission capability in support of DoD and non-DoD missions (Hill AFB 2020, 2022).

Figure 1.3-1. Regional Location of UTTR and DPG

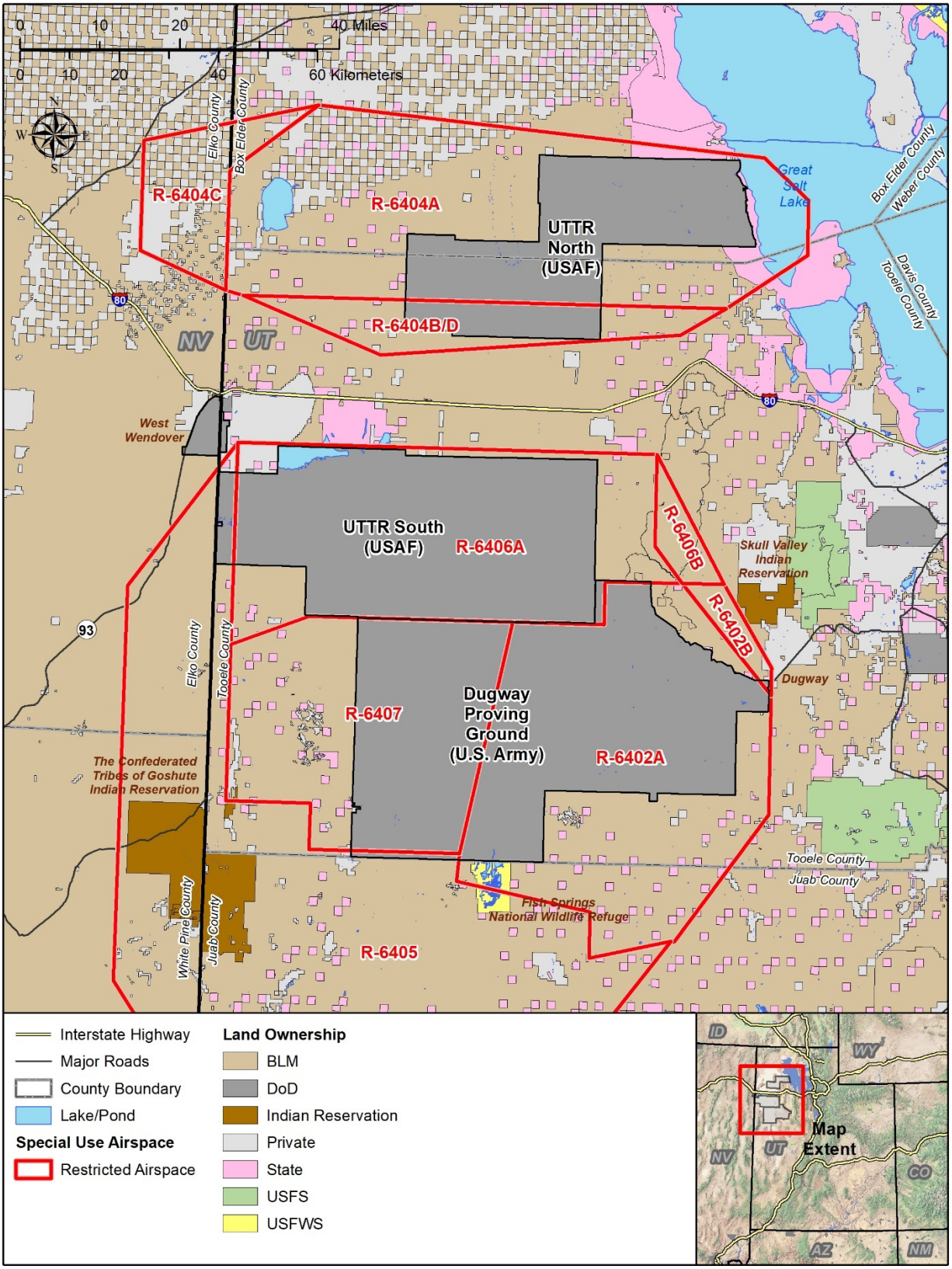

Figure 1.3-2. UTTR North and South, DPG, and Associated Restricted Airspace

In addition to its DoD mission, UTTR has been used by others outside the DoD such as U.S. government agencies, state and local governments, allied foreign governments, and commercial entities (DoD Directive 3200.11, *Major Range and Test Facility Base (MRTFB)*; October 15, 2018). For example, UTTR has been used as a landing site for sample returns in NASA's planetary science missions, including solar wind particles in the 2004 Genesis mission; comet material in the 2006 Stardust mission; and the Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer (OSIRIS-Rex) mission to return material from an asteroid and is proposed to land at UTTR South in 2023 (NASA 1998, 2001, 2013, 2021). Varda's capsule and mission profile are similar to the OSIRIS-REx capsule and mission profile that has been previously assessed to land at UTTR South (NASA 2013).

1.3.2 U.S. Army Dugway Proving Ground (DPG)

DPG operates under direction of the U.S. Army Test and Evaluation Command. Under the West Desert Test Center, a DoD Major Range and Test Facility Base, the primary mission of DPG is the testing of agents of biological origin and chemical warfare agent detection, identification, avoidance, protection, and decontamination equipment for war fighters and first responders and to develop tactics, techniques and procedures in these areas. In addition, the Rapid Integration and Acceptance Center for unmanned aircraft systems (UAS) is located at DPG and is the U.S. Army center for UAS testing (U.S. Army 2019).

1.4 FEDERAL AGENCY ROLES

1.4.1 Lead Agency

To reenter a capsule from orbit and land under FAA airspace, Varda must obtain a vehicle operator license from the FAA for reentries pursuant to 14 CFR Part 450, *Launch and Reentry License Requirements*. The FAA must also approve related airspace closures for reentry operations. The FAA's Federal Action includes:

1) issuing a Vehicle Operator License to Varda, as well as potential future renewals or modifications to the Vehicle Operator License for operations that are within the scope analyzed in this EA, and
2) issuing temporary airspace closures in accordance with FAA Order 7400.2M (*Procedures for Handling Airspace Matters*) to ensure public safety.

The FAA is preparing this EA to support its environmental review when evaluating Varda's license application(s) for RLR operations at UTTR South/Northern DPG. To satisfy FAA's NEPA obligations, the EA must meet the requirements of FAA Order 1050.1F (*Environmental Impacts: Policies and Procedures*) which contains the FAA's policies and procedures for compliance with NEPA. The completion of the environmental review process does not guarantee that the FAA will issue a license to Varda for RLR operations at UTTR South/Northern DPG or a Letter of Agreement (LOA). Varda's license application must also meet FAA safety, risk, and financial responsibility requirements (14 CFR Chapter III).

1.4.2 Cooperating Agency

As the DAF is the owner of the real property where the Proposed Action would occur (i.e., UTTR South), the DAF is a cooperating agency for the preparation and coordination of this EA (40 CFR § 1501.8). The DAF intends to adopt this EA to support its environmental review when evaluating Varda's proposed RLR operations at UTTR South. The DAF will draw its own conclusions from the analysis presented in this EA and assume responsibility for its environmental decision. For the DAF to completely rely on this EA to satisfy its NEPA obligations, the EA must meet the requirements of 32 CFR 989 (*Environmental Impact Analysis Process*) which contains the DAF's policies and procedures for compliance with NEPA.

1.5 SCOPE OF THE ENVIRONMENTAL ANALYSIS

This EA includes an analysis of potential environmental impacts associated with implementation of either the action alternative (Proposed Action) or the No-Action Alternative. The EA identifies environmental permits relevant to the Proposed Action and describes, in terms of a regional overview or a site-specific description, the affected environment and environmental consequences of the action. The EA also

identifies, as necessary and applicable, management measures to avoid, prevent, or minimize environmental impacts.

1.6 RELEVANT LAWS AND REGULATIONS

This EA has been prepared based upon federal and state laws, statutes, regulations, and policies pertinent to the implementation of the proposed action, including but not limited to the following:

- NEPA (42 U.S.C. 4321–4370h), which requires an environmental analysis for major federal actions that have the potential to significantly impact the quality of the human environment.
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508)
- FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (16 July 2015)
- DAF regulations for implementing NEPA (32 CFR 989, *Environmental Impact Analysis Process*), which provides DAF policy for implementing CEQ regulations and NEPA.
- Air Force Policy Directive (AFPD) 32-70, *Environmental Considerations in Air Force Programs and Activities* (30 July 2018)
- Air Force Instruction (AFI) 32-7001, *Environmental Management* (23 August 2019)
- Air Force Guidance Memorandum to AFI 32-7001, *Environmental Management* (21 October 2020)
- AFI 32-7020, *Environmental Restoration Program* (12 March 2020)
- Air Force Guidance Memorandum to Department of the Air Force Instruction (DAFI) 32-7020, *Environmental Restoration Program* (15 December 2020)
- Air Force Manual (AFMAN) 32-7002, *Environmental Compliance and Pollution Prevention* (4 February 2020)
- Department of Defense (DoD) Manual 4715.20, *Defense Environmental Restoration Program (DERP) Management* (Change 1, 31 August 2018)
- Clean Air Act (CAA) (42 U.S.C. 7401 *et seq*.)
- Clean Water Act (33 U.S.C. 1251 *et seq*.)
- Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq*.)
- Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–712)
- Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668–668d)
- Archeological and Historic Data Preservation Act (54 U.S.C. 3125)
- Archaeological Resources Protection Act (16 U.S.C. 470aa-470mm)
- National Historic Preservation Act (NHPA) (54 U.S.C. 306108 *et seq*.)
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 *et seq*.)
- Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901-6992k)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601 *et seq*.)
- Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*

A description of the Proposed Action's consistency with these laws, policies and regulations, as well as the names of regulatory agencies responsible for their implementation, is cited in Chapter 3 as necessary.

1.7 PUBLIC AND AGENCY PARTICIPATION AND INTERGOVERNMENTAL COORDINATION

The CEQ regulations implementing NEPA (40 CFR 1506.6) direct agencies to involve the public in preparing and implementing their NEPA procedures. Public participation opportunities with respect to this Draft EA and decision making on the proposed action are guided by FAA Order 1050.1F. The FAA notified relevant federal, state, and local agencies, Native American tribes, and the general public within the surrounding communities of the Proposed Action and provided them sufficient time to make known their environmental concerns specific to the Proposed Action. Consideration of the views and information of all interested persons promotes open communication and enables better decision making. All agencies, organizations, tribes, and members of the public with a potential interest in the proposed action are

encouraged to participate in the decision-making process during a 30-day public comment period of the Draft EA from 29 March 2023 to 27 April 2023. A Notice of Availability of the Draft EA was published on 29 March 2023 in the Tooele Transcript and the Salt Lake Tribune. Printed copies of the Draft EA were placed in the following locations:

- West Wendover City Hall, 1111 N Gene L. Jones Way, West Wendover, Nevada
- Wendover City Hall, 920 Wendover Blvd, Wendover, Utah
- Tooele City Public Library, 128 W Vine St, Tooele, Utah

In addition, a digital copy of the Draft EA is available for public review at:
https://www.faa.gov/space/environmental/nepa_docs

1.7.1 Agency Consultations and Coordination

To be provided after completion of public review of Draft EA.

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Chapter 2. Description of the Proposed Action and Alternatives

2.1 PROPOSED ACTION

This chapter describes in detail the Proposed Action including the characteristics of Varda's small capsule; the RLR operations; and the site screening criteria used to identify a landing area for the Varda capsule as well as alternatives considered but not carried forward. Under the Proposed Action, Varda would conduct a maximum of 4 RLR operations during 2023-2025 (or approx. 1-2 RLR operations/year) within UTTR South or Northern DPG (Figure 2.1-2). Proposed RLR operations would occur during daylight hours only.

2.1.1 Varda Capsule

The Varda capsule is approximately 3 ft in diameter, 2.5 ft tall, and weighs less than 200 pounds (lbs) (Figure 2.1-1 and Figure 2.1-5). It is a 45° sphere aluminum cone with a spherical aft body as an aeroshell. The 45° cone is aerodynamically stable in all flight regimes and if perturbed it quickly returns to low angles of attack. The primary thermal protective shield is a heat shield material developed by NASA: conformal phenolic impregnated carbon ablator (CPICA). The back-shell would experience less heat and would use a densified oxidized polyacrylonitrile (OPAN) felt as its thermal protective shield. The vehicle includes an Iridium beacon for real-time recovery tracking and non-volatile memory for the recording of the capsule's position during its descent. The capsule would contain a small 28-volt, 92 watt-hour lithium-ion (Li-ion) battery[(1)] pack in a metal housing. The battery contains short circuit protection, thermal protection, meets Range Commanders Council 324-01 for Range Safety Space Qualification for Li-ion batteries, and exceeds shock and vibration requirements. The capsule does not contain any propellants, gasses, or toxic materials.

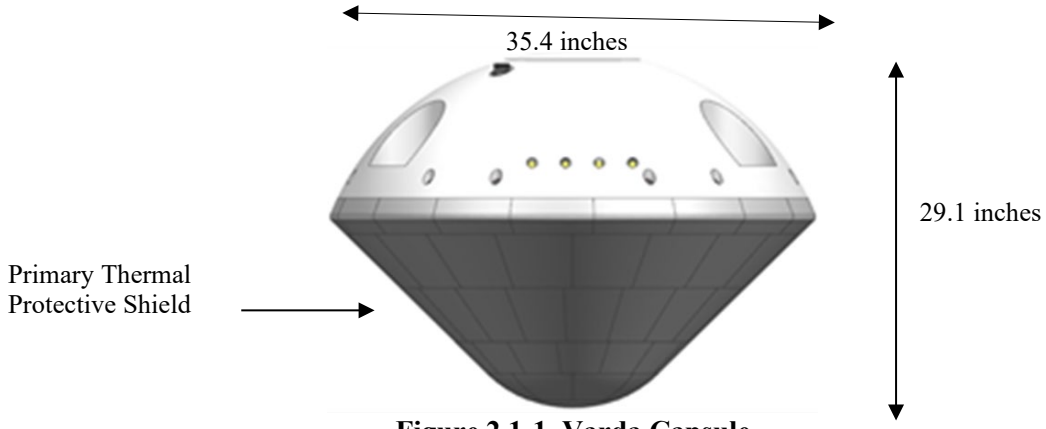


Figure 2.1-1. Varda Capsule

2.1.2 Reentry, Landing, and Recovery (RLR) Operations

2.1.2.1 Reentry Operations and Airspace Management

The Varda capsule would enter UTTR airspace from the north-northeast along a south-southwest trajectory (Figure 2.1-2). At approximately 57 miles from the center of the proposed landing area, the capsule would be at an altitude of 148,000 ft above mean sea level (MSL) and traveling at Mach 10.5. The capsule continues to descend and slow and by the time it enters the airspace above the proposed landing area it would be at an altitude of 114,000 ft MSL and traveling at Mach 3.4. The capsule would descend along the proposed trajectory in a gradual fashion until it reached the area over UTTR South where it would then descend almost straight down to the proposed landing area within UTTR South. Figure 2.1-3 provides a 3-dimensional depiction of the modeled trajectory and the capsule's descent into UTTR South.

[(1)]The amount of Li contained in a 28 volt, 92 watt-hour Li-ion battery = 0.3 x rated capacity (in ampere hours [Ah]). For the Varda capsule battery: 92 watt-hours = 3.3 Ah; therefore, 3.3 Ah x 0.3 = 1 gram of Li (Battery University 2022).

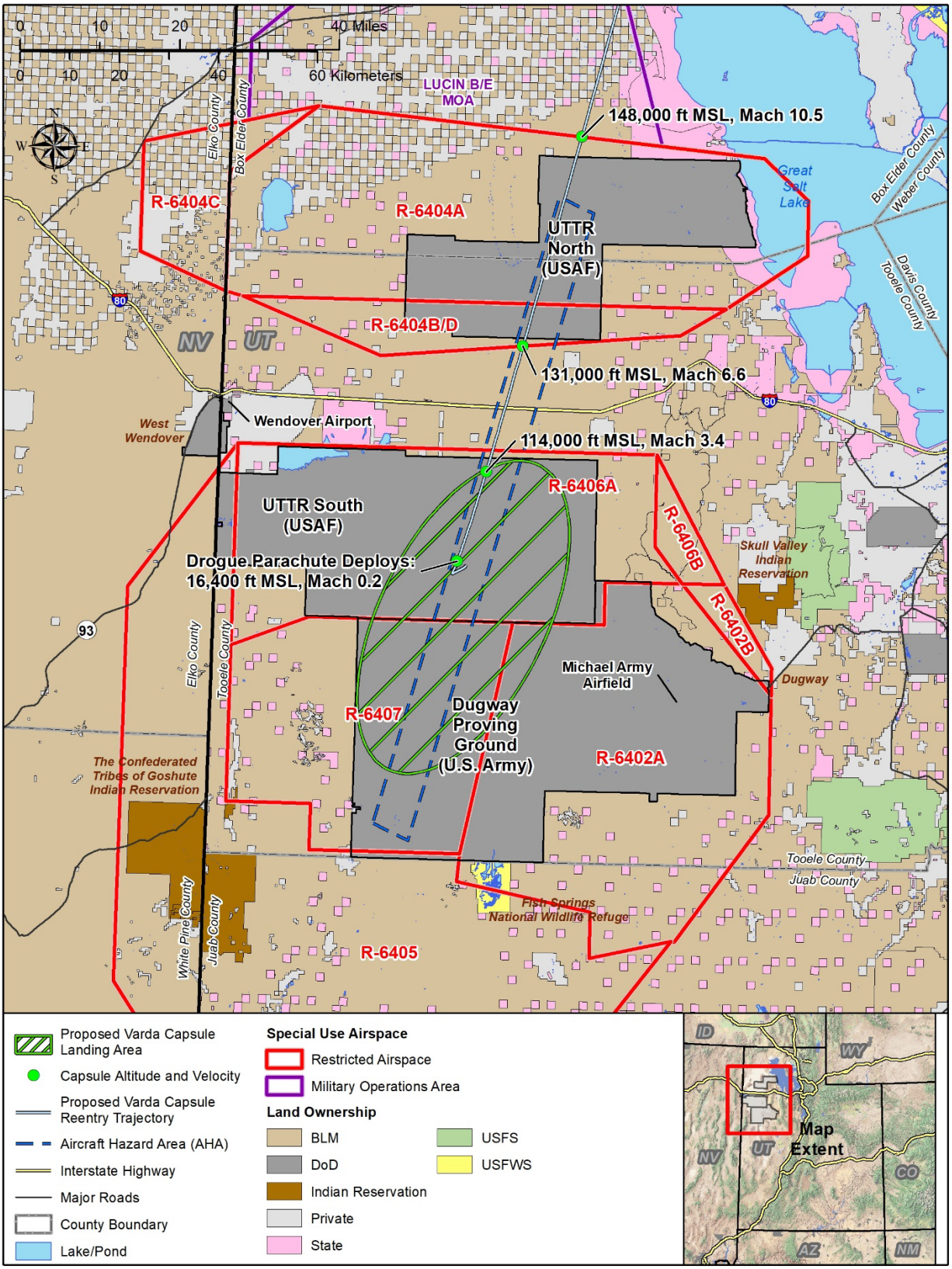


Figure 2.1-2. Proposed Varda Capsule Reentry Trajectory and Landing Area within UTTR South and Northern DPG

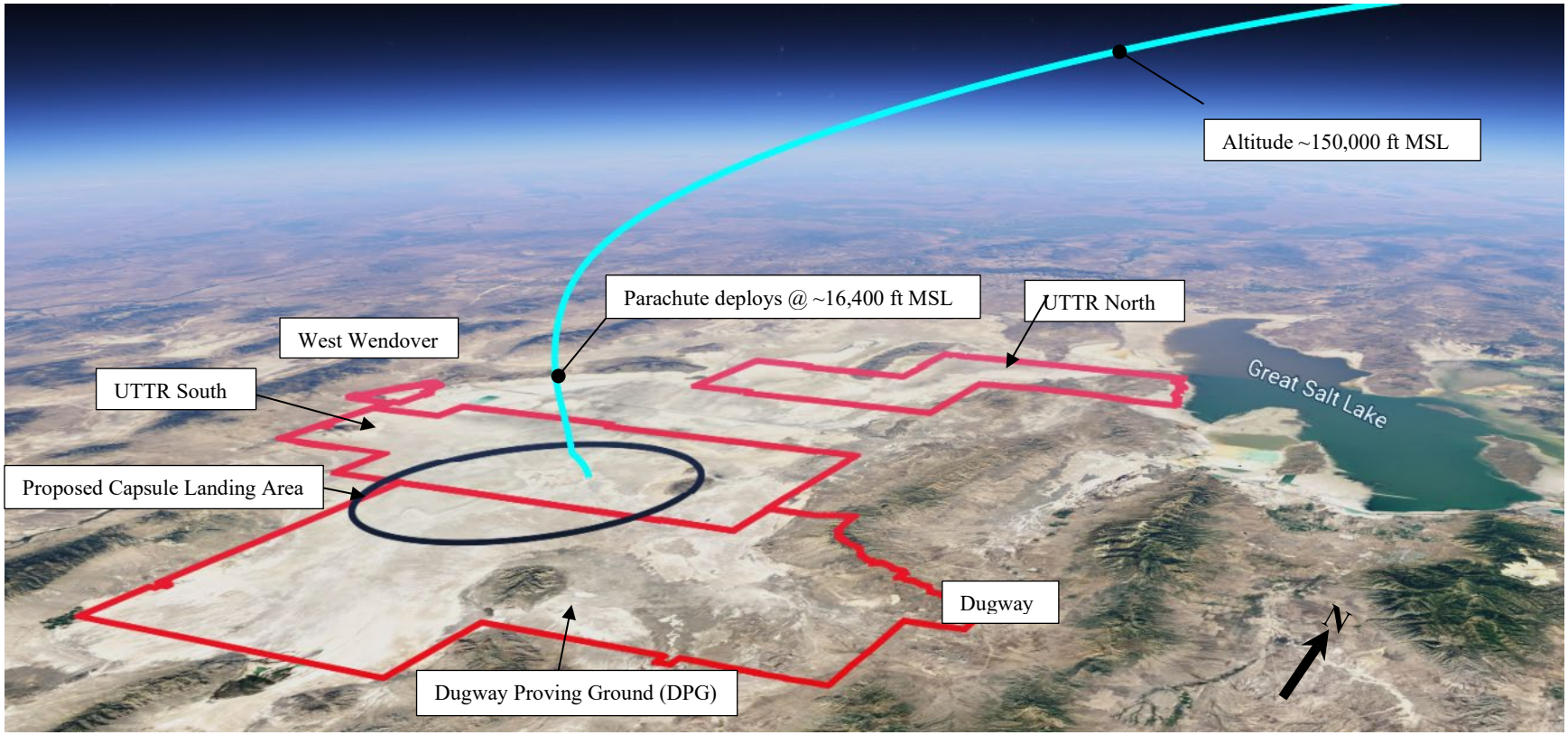


Figure 2.1-3. 3-Dimensional View of Proposed Varda Capsule Reentry Trajectory and Landing Area within UTTR South and Northern DPG
(not to scale)

Based on the modeled reentry trajectory, as the capsule loses velocity it begins to descend straight down due to atmospheric drag. Shortly after this near vertical trajectory the drogue parachute would deploy (Figure 2.1-3) and the capsule would then continue its near vertical descent. After the main parachute deploys, the capsule would continue to lose velocity and would descend gradually to the ground with some slight movement to the east due to winds that are predominantly from the west. Although considered highly unlikely given the rigorous testing of the parachute systems, if the parachute system fails, extensive modeling has shown that the capsule would continue to descend straight down to the ground within DoD lands (i.e., UTTR South or northern DPG) and would impact the ground at much greater velocity.

The proposed landing area would encompass approximately 321,000 acres: 233,000 acres within UTTR South and 88,500 acres within the northwestern portion of DPG. Restricted airspace (R-) overlies the entirety of UTTR South (R-6406A) and DPG (R-6407 and R-6402A) and extends from the surface to 58,000 ft MSL (FAA 2022) (Figure 2.1-2). To enable descent and landing of the reentry capsule, FAA Air Traffic Organization (ATO) would coordinate and manage airspace outside of restricted airspace and UTTR Air Traffic Control (ATC) would coordinate and manage restricted airspace surveillance and clearance. All reentry operations would comply with the necessary notification requirements, including establishing and issuing flight restrictions and Notices to Air Missions (NOTAMs) and coordinating with FAA ATO. A NOTAM provides notice of unanticipated or temporary changes to components of, or hazards in, the National Airspace System (FAA Order 7930.2S [CHG 2], *Notices to Air Missions [NOTAM]*). The FAA issues NOTAMs 24-72 hours prior to a reentry activity in the airspace to notify pilots and other interested parties of temporary conditions. Advance notice via NOTAMs and the identification of the aircraft hazard area (AHA) (Figure 2.1-2) would assist pilots in scheduling around any temporary disruption of flight in the area of operation. The AHA is the area where no aircraft can be present prior to capsule reentry operations. Reentry and landing operations would be infrequent (4 operations are proposed from 2023 through 2025, or approx. 1-2 per year), of short duration, and scheduled in advance to minimize interruption to air traffic.

To comply with the FAA's licensing requirements, Varda would enter into an LOA with FAA ATO Space Operations (located at ATC System Command Center), and any other affected ATO ATC facilities, and Headquarters UTTR to accommodate the flight parameters of Varda reentry operations. The LOA outlines and defines procedures for notification and real-time communication prior to, during, and after an operation; procedures for issuance of a NOTAM, including the time when the NOTAM is issued prior to reentry activities; and any additional measures deemed necessary to protect public health and safety. The Proposed Action would not require the FAA to alter the dimensions (shape and altitude) of the airspace. However, temporary closures of existing airspace may be necessary to ensure public safety during the proposed operations. Advance notice via NOTAMs would assist general aviation pilots in scheduling around any temporary disruption of flight activities in the area of operation. Reentries would be of short duration and scheduled in advance to minimize interruption to airspace.

2.1.2.2 Landing Operations

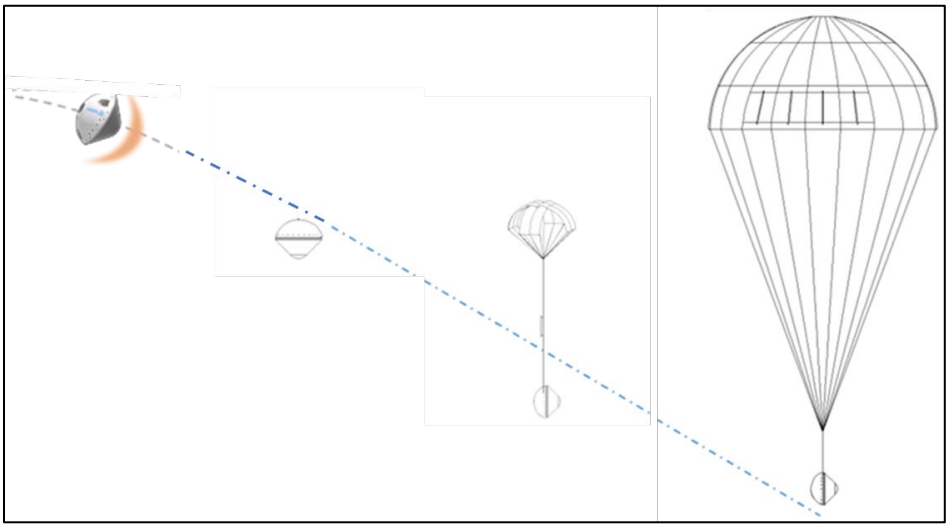
The proposed Varda capsule landing area would be an ellipse approximately 28 miles from north to south, 22 miles from east to west, and covers 321,520 acres (Figure 2.1-2). As the landing area would be located within a weapons/munitions test area, there are no facilities or structures, other than those used as targets, in the landing area.

After initial reentry and at approximately 16,400 ft MSL above the proposed landing area (Figure 2.1-4b), the capsule would deploy a drogue parachute[(1)] and a main parachute before landing. The parachute system uses a 6.2-ft diameter cruciform parachute as a drogue (Figure 2.1-4c) that provides the initial deceleration

[(1)] Drogue parachute: a small parachute used to reduce the speed or improve stability of an object.

of the capsule, and a 21-ft diameter gliding triconical main parachute (Figure 2.1-4d). The parachute system contains a drogue mortar and two small time-delayed explosive line cutters between the drogue and main parachutes. The release of the drogue parachute strips the main parachute from the capsule compartment. The drogue parachute would land within UTTR South and would be recovered. The main parachute supports the descent of the capsule to the ground and would be recovered with the capsule (Figure 2.1-4d and Figure 2.1-5). Velocity of the capsule at touchdown would not exceed 30 ft/second (~20 miles per hour).

Total time for reentry and landing operations from the beginning of reentry to touchdown of the capsule within the proposed landing area would be approximately 16 minutes.



(a)	(b)	(c)	(d)
Reentry of capsule.	Mortar deploys at 16,400 ft MSL pushing out portion of thermal protective shield.	Drogue parachute deployed; remains with capsule for ~8 seconds.	Drogue parachute lifts main parachute from housing; main parachute reaches line stretch and inflates.

Figure 2.1-4. Proposed Parachute Landing Operations for Varda Capsule
(*Note*: not to scale)

Figure 2.1-5. Recovery of the Varda Capsule and Main Parachute after a 2022 Parachute Test in Arizona

2.1.2.3 Recovery Operations

A Recovery Team would be pre-positioned outside of the landing area at Wig Support at Michael Army Airfield within the northeastern portion of DPG approximately 25 miles east of the center of the landing area. The Recovery Team would consist of 8-12 personnel from UTTR and Varda, and 2 helicopters (e.g., Bell 206). The helicopters would come from Woods Cross, approximately 7 miles north of Salt Lake City. The proposed landing area within UTTR South and DPG has been previously evaluated and used for similar operations, including previous NASA capsule recovery operations, and the Recovery Team would follow proven UTTR and DPG procedures and limit ground disturbances during recovery efforts.

The capsule contains a drogue mortar and two small time-delayed explosive line cutters between the drogue and main parachutes (Net Explosive Weight: 120 milligrams; Explosives Class: 1.4[(1)]). This device would be safely expended during the successful deployment of the parachutes. If the parachute system experiences an unlikely malfunction and the mortar does not deploy, then an Explosive Ordnance Disposal (EOD) technician would inspect and safe the vehicle prior to letting additional Recovery Team personnel approach the capsule. Once the capsule is confirmed to be safe, it would be switched into a state whereby it ceases to make any radio transmissions. These safety steps ensure that the Recovery Team may safely work as closely as needed with the capsule during the recovery process.

Weighing less than 200 lbs, there are no extraordinary measures required for recovery and transport of the capsule and main and drogue parachutes. The capsule would primarily be handled manually with a small, specialized handling fixture which serves to cradle the capsule during transport like a small hammock. It is anticipated that the helicopters would land near the capsule touchdown point, personnel would safe and secure the capsule, and then load it and the main parachute into the helicopters. The capsule and parachutes would be transported to an airport either at Wendover, 35 miles to the northwest of the center of the landing area, or Michael Army Airfield on DPG, 31 miles southwest of the center of the landing area (Figure 2.1-2). The capsule and parachutes would then be packaged for shipping back to Varda Headquarters in California in a truck or van.

2.1.2.4 Contingency Abort Locations

In the event the capsule does not meet Varda reentry criteria, the vehicle would remain in orbit. Varda would exercise one contingency opportunity (approximately 2-week duration) to reconcile issues for a final reentry attempt. If the issue cannot be reconciled, the capsule would be abandoned in orbit. For all orbital maneuvers and reentry maneuvers, Varda operators have a procedure for carrying out collision avoidance analysis consistent with 14 CFR §450.169 (*Launch and reentry collision avoidance analysis requirements*). Prior to launch, Varda would submit the planned orbital/reentry maneuvers to the 18th Space Defense Squadron for collision avoidance screening. Varda has also completed an Orbital Debris Assessment Report and submitted it to the Federal Communications Commission. In case of an early spacecraft failure, the entire system would remain in its initial orbit (500-km sun-synchronous low-earth orbit [LEO]). The spacecraft orbit is expected to decay within 11.9 years and would reenter and demise in the atmosphere. The resulting expected human casualty (Ec) from such a failure and uncontrolled reentry is 68.9 in a million. This meets the public safety requirement of Section 4.7.2 (*Requirements for the Reentry Debris Casualty Risk Technical Area*) of NASA-STD-8719.14C, *Process for Limiting Orbital Debris*. In addition, this meets the requirements of 14 CFR § 450.171 (*Safety at end of launch*).

[(1)]Explosives Class 1.4 = consists of explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected (49 CFR 173.50) (e.g., consumer fireworks, ammunition, railway fog signals, model rocket motors).

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

2.2.1 RLR Site Selection Criteria

Selecting a recovery or landing area for a capsule return depends largely on matching the safety and mission-critical criteria to the facilities and capabilities of the prospective landing area. Issues of concern include minimal risk to public safety and to the returned capsule payload. Because a water landing would very likely compromise the mission objectives by increasing the risk of sinking and complete loss of the capsule, a recovery area on land is mandated. A site on U.S. soil is also required given, (a) the time, uncertainty, and complexity associated with obtaining the necessary agreements between the U.S. and a foreign government; and (b) maintaining integrity, safety, and security of the capsule during recovery and transport back to the U.S. would be very challenging or prohibitive.

Sites that are currently or routinely closed to the public, such as restricted DoD property, would minimize the chance of the reentering capsule harming individuals or their property within the controlled site boundaries. Although public lands (e.g., Bureau of Land Management) may potentially support a proposed capsule landing area, they were dismissed from consideration given the very large area (approximately 500 square miles [mi^2]) that would need to be closed to the public during RLR operations. Enforcement of such closures on public lands would be logistically prohibitive and would require extensive security and/or law enforcement support.

Varda developed screening criteria to define reasonable alternative sites that could meet the functional and operational requirements of the Varda mission and the purpose and need of the Proposed Action. In particular, an alternative site should occur on a DoD-controlled test range with sufficient airspace and land area to safely and securely accommodate the proposed RLR operations of the Varda capsule, and that has previously supported similar recovery operations. Varda determined that a reasonable alternative to be considered as a landing area for Varda capsule RLR operations should meet the following six criteria:

- Safety
  - The site must accommodate an approximately 500-mi^2 (320,000-acre) landing area (approximately 45 miles downrange by 37 miles cross-range), with the major axis of the landing area oriented from north-northeast to south-southwest.
  - The site must have restricted airspace to provide separation from commercial and civilian air traffic.
- Capsule Return
  - The site must have a flat recovery area, free from hills or terrain features that would prevent recovery operations or would damage the capsule by imparting a tumbling action at touchdown.
  - The locale must enable delivery of the capsule back to Varda Headquarters in California for further investigation, analysis, and processing.
- Range Recovery
  - The capability of tracking the descending capsule on an established range will aid in locating and recovering the capsule and provide valuable data for post-flight analysis.
  - Ground recovery operations must occur within a restricted area that is closed to the public to ensure the safety of recovery personnel and security of the capsule.

2.2.2 Identification of Potential Varda Capsule Landing and Recovery Areas

Based upon the above site criteria, six areas within DoD-managed lands were initially considered (Table 2.2-1):

- UTTR South/DPG, Utah
- White Sands Missile Range (WSMR), New Mexico
- Fallon Range Training Complex (FRTC), Nevada

- Nevada Test and Training Range (NTTR)
- Barry M. Goldwater Range (BMGR), Arizona
- Naval Weapons Systems Training Facility Boardman (Boardman), Oregon

Table 2.2-1. Summary of Potential Varda Capsule Landing and Recovery Areas and Site Selection Criteria

Site Selection Criterion	Potential Varda Capsule Landing and Recovery Area					
	UTTR/ DPG	WSMR	FRTC	NTTR	BMGR	Boardman
Landing area of 500 mi^2 oriented in a NE-SW direction	+	-	-	-	-	-
Restricted Airspace	+	+	+	+	+	+
Flat recovery area	+	-	-	-	+	+
Proximity to Varda headquarters in California	+	+	+	+	+	+
Availability of capsule tracking assets	+	+	-	-	-	-
Safety and security of recovery area	+	+	+	+	+	+
Total Criteria Met (of 6)	6	4	3	3	4	4

Notes: + = meets criterion; - = does not meet criterion.

Of the potential landing areas assessed, only UTTR/DPG was determined to meet all the site selection criteria. While all the potential sites met the criteria of restricted airspace, proximity to Varda headquarters in California, and safety and security of the recovery area, UTTR/DPG was the only area where the proposed capsule landing area would fit completely within DoD lands. UTTR/DPG has the largest overland restricted airspace, as well as the largest overland contiguous block of supersonic-authorized restricted airspace in the continental U.S. Although WSMR, NTTR, and BMGR each provide >2 million acres of DoD-managed lands, given the trajectory of the Varda capsule and required southwest-northeast orientation of the landing area, none of these ranges would completely contain the total 500-mi^2 landing area within DoD lands. Boardman and FRTC only have 73 mi^2 and 360 mi^2, respectively, of DoD-managed lands, which would not support the required 500 mi^2 landing area. The lack of a flat recovery area at WSMR, FRTC, and NTTR also eliminated these sites from further consideration. In addition, the lack of capsule tracking assets at FRTC, NTTR, BMGR, and Boardman eliminated these sites from further consideration. Lastly, UTTR has been the recovery site for several NASA small capsule returns, including the Genesis mission in September 2004, the Stardust mission in January 2006, and will be the recovery site for NASA's OSIRIS-REx mission, scheduled to land in UTTR South in September 2023 (NASA 1998, 2013, 2021).

2.3 No-Action Alternative

CEQ regulations require the inclusion of a No-Action Alternative in an EA to serve as the basis for comparing the environmental consequences of the Proposed Action with the existing (baseline) conditions. Under the No-Action Alternative, Varda would not conduct small capsule RLR operations at UTTR South or northern DPG. Varda and its DoD partners would be unable to gather data about hypersonic reentry conditions. Varda would not be able to perform any space-based research or develop on-orbit manufacturing capabilities. Data collected in orbit or during reentry could not be compared with scientific models, or estimations, or ground-based testing intended to simulate those environments. In addition, under the No-Action Alternative, the FAA would not issue a license to Varda for RLR operations at UTTR South. Therefore, although the No-Action Alternative would not meet the purpose of and need for the Proposed Action, it is carried forward for analysis in this EA as a baseline from which to compare the impacts of the action alternatives, as required by NEPA and CEQ regulations.

2.4 Summary Comparison of Environmental Consequences

Table 2.4-1 summarizes the potential environmental consequences from Chapter 3 where the project description from Chapter 2 is overlaid on the baseline conditions from Chapter 3. The consequences are

presented for each environmental resource area and are described for the Proposed Action and the No-Action Alternative.

Table 2.4-1. Summary Comparison of Environmental Consequences

Resource Area	Proposed Action	No-Action Alternative
Air Quality	Under the Proposed Action, emissions of all criteria pollutants from proposed Varda capsule recovery operations would be below their respective annual *de minimis* levels, so a formal conformity determination would not be required, and a Record of Non-Applicability (RONA) has been prepared. Therefore, no significant impacts to local or regional air quality are anticipated with implementation of the Proposed Action.	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.2, would remain unchanged.
Climate	Under the Proposed Action, insignificant greenhouse gas (GHG) emissions associated with the proposed Varda capsule recovery operations would not contribute to global warming to any discernible extent. Additionally, possible increases in GHG emissions caused by short-term airspace closures (e.g., from re-routed or grounded aircraft) during commercial space operations are not expected to result in significant climate-related impacts and therefore were not calculated for the Proposed Action. Therefore, no significant impacts to climate change are anticipated with implementation of the Proposed Action.	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.3, would remain unchanged.
Noise and Noise-Compatible Land Use	Proposed Varda reentry operations would occur on the proposed trajectory a maximum of two times per year (i.e., or a maximum of four operations during 2023-2025). There would be a maximum of two very low level (0.04 pounds per square foot [psf]) sonic booms per year along the capsule reentry trajectory during the period of 2023 through 2025. The proposed capsule reentry trajectory and associated sonic boom area within UTTR South and DPG underlies restricted military airspace where permitted supersonic operations occur. Therefore, proposed Varda reentry operations and associated sonic booms would not result in significant impacts to the regional noise environment in the vicinity of UTTR South and DPG.	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.4, would remain unchanged.
Historical, Architectural, Archeological, and Cultural Resources	With implementation of the measures identified in the Programmatic Agreement (PA) between Hill AFB, the Utah State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation, which includes stipulations to assess impacts and mitigate any potential adverse effects to historic properties on UTTR South from the landing and retrieval of objects from space and high in earth's atmosphere, as well as mitigation and monitoring measures for capsule retrieval on DPG lands, there would be no significant impacts to cultural resources within the area of potential effect (APE) on UTTR South and DPG lands.	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.5, would remain unchanged.
Department of Transportation (DOT) Act Section 4(f) Properties	Within the proposed Varda capsule landing area there are 209 NRHP-eligible sites that are considered Section 4(f) properties: 93 on UTTR South and 116 on northern DPG. In addition, two Section 4(f) properties occur outside the landing area but are within the region of influence: Fish Springs National Wildlife Refuge (NWR) and Deseret Peak Wilderness/Uinta-Wasatch-Cache National Forest. Proposed Varda reentry operations would occur on the proposed trajectory a maximum of two times per year (i.e., or a maximum of four operations during 2023-2025). A	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.6, would remain unchanged.

Table 2.4-1. Summary Comparison of Environmental Consequences

Resource Area	Proposed Action	No-Action Alternative
	sonic boom at 0.01 and 0.02 psf that would be received at the NWR and National Forest, respectively, would be unlikely to be noticed from background ambient activities that would be occurring at the time of any sonic boom from the Varda capsule upon reentry. The Proposed Action would not substantially diminish the protected activities, features, or attributes of any of the properties identified, and thus would not result in substantial impairment of the properties. Therefore, the Proposed Action would not be considered a constructive use of these properties and would not invoke Section 4(f) of the DOT Act. The Proposed Action would not result in significant impacts on Section 4(f) properties.	
Biological Resources	Under the Proposed Action, the proposed capsule landing area would occur within a large unvegetated playa or dry lake bed generally devoid of vegetation and wildlife, including special-status species. Any wildlife species potentially within the proposed capsule landing area are expected to move away at the sight of the capsule and associated parachute during its descent. Impacts to wildlife from the low-level 0.04 psf sonic boom would not be significant. Therefore, there would be no significant impacts to biological resources with implementation of the Proposed Action.	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.7, would remain unchanged.
Airspace	Implementation of the proposed action is not anticipated to result in significant impacts to airspace use or management.	Under the No-Action Alternative, the proposed Varda capsule RLR operations at UTTR South/DPG would not occur. Consequently, baseline conditions, as described in Section 3.8, would remain unchanged.

Chapter 3.
Affected Environment and Environmental Consequences

3.1 INTRODUCTION

This chapter provides a description of the affected environment and potential environmental consequences for the environmental resource or impact categories that have the potential to be affected by the Proposed Action and No-Action Alternative. This EA examines two general areas or regions of influence (ROIs) that encompass the areas potentially affected by the Proposed Action. The first ROI is associated with the proposed reentry trajectory of the Varda capsule and includes the airspace overlying UTTR and DPG and the potential sonic boom area. The second ROI includes the landing and recovery area on UTTR South. The ROIs for each environmental impact category vary and are defined in this chapter. The level of detail provided in this chapter is commensurate with the importance of the potential impact on the environmental impact categories.

In addition to those environmental resources typically addressed in FAA NEPA documents, as stated in Section 1.4.1, this EA complies with DAF's NEPA requirements so the DAF can easily adopt this EA and issue its own FONSI, if applicable. Based on FAA and DAF NEPA requirements, 17 environmental impact categories were initially considered for analysis:

- Air Quality
- Climate
- Airspace
- Biological Resources
- Historical, Architectural, Archeological, and Cultural Resources
- Noise and Noise-compatible Land Use
- Water Resources
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Coastal Resources
- Department of Transportation Act Section 4(f) Properties
- Farmlands
- Land Use
- Natural Resources and Energy Supply/Utilities
- Socioeconomics, Environmental Justice, and Children's Health and Safety Risks
- Visual Effects
- Geology and Soils
- Public Health and Safety

Determining which environmental resource areas will be analyzed versus those not carried forward for detailed analysis is part of the EA scoping process. CEQ regulations (40 CFR §1501.7(a)(3)) encourage project proponents to identify and eliminate from detailed study the environmental resource areas that are not applicable or have no potential to be impacted through implementation of their respective proposed actions. The following environmental impact categories are not analyzed in detail for the reasons stated.

- **Water Resources**. There are no permanent streams or other surface water features found within the proposed Varda capsule landing area (DPG 2016; Hill AFB 2020). In addition, as construction activities would not occur; the capsule does not contain propellants, gasses, or toxic materials; and the landing of the capsule by parachute would not penetrate the surface of the ground, the proposed action would also have no impact on groundwater within the study area. Therefore, there would be no impacts to water resources with implementation of the Proposed Action.

- **Hazardous Materials, Solid Waste, and Pollution Prevention**. Upon landing, the Varda capsule would not contain any propellants, gasses, or toxic materials. The capsule contains a drogue mortar and two small time-delayed explosive line cutters between the drogue and main parachutes. The explosive material within this device would be safely expended during the successful deployment of the parachutes. If the explosive material is not expended, then the capsule would not descend gradually by means of the parachutes and would hit the ground at a much greater velocity, causing the capsule to break apart. However, only 120 milligrams of Class 1.4 explosives would be present in the capsule which is not a significant hazardous material (see Section 2.1.2.3). The only hazardous material remaining on the capsule upon its successful landing would be a small Li-ion battery pack in a metal housing. The total amount of lithium in the battery is 1 gram (see Section 2.1.1). The battery contains short circuit protection, thermal protection, meets Range Commanders Council 324-01 for Range Safety Space Qualification for Li-ion batteries, and exceeds shock and vibration requirements. In addition, the potential for the capsule to impact existing hazardous materials and Installation Restoration Program (IRP) sites within the landing area within UTTR South is considered extremely unlikely and discountable. However, if any materials from the Proposed Action (e.g., parachute, capsule) unexpectedly reaches an IRP site, the Hill AFB Environmental Restoration Manager will be contacted. Therefore, implementation of the Proposed Action would not result in impacts associated with hazardous materials or wastes.
- **Coastal Resources**. The Proposed Action does not occur within the coastal environment and therefore would not impact coastal resources.
- **Farmlands.** As defined by the Farmland Protection Policy Act, there are no farmlands within the proposed landing area. Therefore, there would be no impacts to farmlands with implementation of the Proposed Action.
- **Land Use.** The Proposed Action would not result in any new types of ground operations and would not change the existing or planned land use of UTTR South or DPG.
- **Natural Resources and Energy Supply/Utilities.** The Proposed Action would not result in any measurable effect on local supplies of energy or natural resources. The Proposed Action would not result in the development of new facilities or result in notable changes in local energy demands or consumption of other natural resources. The Proposed Action would not require additional sources of power or other public utilities. Civilian or commercial aircraft in the vicinity of the proposed capsule landing area could re-route if abiding by the NOTAM and restricted airspace closures. Potential impacts on aircraft re-routing would be temporary, infrequent, and anticipated to result in a negligible increase in fuel expenditure.
- **Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks.** The Proposed Action would not require construction or development. Only existing Varda and UTTR personnel would be used to conduct RLR activities and therefore would not induce population growth, affect the number of jobs in nearby communities, or result in any measurable impact on regional socioeconomic activity. Potential socioeconomic impacts from re-routing aircraft due to the proposed RLR operations are expected to be negligible relative to other causes leading to the re-routing of aircraft. Other issues or activities such as weather and military exercises also require airspace closures and may have longer and larger closure areas than proposed Varda operations. All RLR operations would continue to comply with the necessary notification requirements, including issuance of NOTAMs, consistent with current procedures.

  Potential socioeconomic impacts include additional airline operating costs for increased flight distances and times resulting from re-routing aircraft and increased passenger costs as a result of impacted passenger travel, including time lost from delayed flights, flight cancellations, and missed connections. Operations would not result in the closure of any public airport during the operation nor so severely restrict the use of the surrounding airspace as to prevent access to an airport for an extended

period of time. Given existing airspace closures for proposed RLR operations are short-term and temporary as discussed in Chapter 2, the temporary airspace closures would not result in significant socioeconomic impacts. Further, local air traffic controls would coordinate with airports and aircraft operators to minimize the effect of these infrequent RLR operations on airport traffic flows as well as traffic flows in en-route airspace.

There would be no impacts that disproportionately affect environmental justice populations. Additionally, no component of the Proposed Action would result in a disproportionate health and safety risk to children. The nearest population center (West Wendover) is approximately 55 miles to the northwest of the proposed capsule landing area. Because no schools, hospitals, or population centers or other areas typically associated with the aggregation of children would be affected by implementation of the Proposed Action, the environmental justice and children's environmental health and safety risks categories are not carried forward for detailed analysis in the EA.

- **Visual Effects.** Visual effects are related to the extent to which the Proposed Action would produce light emissions that create annoyance or interfere with activities; or the extent to which the Proposed Action would detract from, or contrast with, visual resources or the visual character of the existing environment. UTTR currently supports existing military aircraft operations. The proposed RLR operations would not differ visually from those activities already occurring at UTTR South and DPG. The Proposed Action would not degrade the existing visual character or quality of UTTR, DPG, and their surroundings and would have no adverse effect on a scenic vista or scenic resources. Under the Proposed Action, no new source of substantial light or glare would be created that would adversely affect day or nighttime views in the area. Therefore, implementation of the Proposed Action would not have significant visual effects.
- **Geology and Soils**. The landing area within UTTR South has been evaluated and widely used for other UTTR operations, including previous NASA capsule recovery operations, and the Recovery Team would follow proven UTTR procedures and limit ground disturbances during recovery efforts. Upon landing, the capsule would impact an area of approximately 7 square feet (ft^2). Based on previous tests of the capsule and parachute system, upon landing the capsule does not penetrate the soil's surface and simply rolls on its side. The impact on this small area would not result in significant impacts to geological or soil resources.
- **Public Health and Safety**. Proposed RLR operations would be conducted by DAF and Varda personnel in accordance with all applicable DAF safety regulations, published DAF technical orders, and DAF Occupational Safety and Health requirements. If the parachute system experiences an unlikely malfunction and the mortar does not deploy, then an EOD technician would inspect and safe the vehicle prior to letting additional Recovery Team personnel approach the capsule. These safety steps ensure that the Recovery Team may safely work as closely as needed with the capsule during the recovery process. The proposed Varda capsule landing area is within an area closed to the public and proposed RLR operations would not result in impacts to public health and safety.

Based on the above, the following environmental impact categories are assessed in this EA:

- Air Quality
- Climate
- Noise and Noise-Compatible Land Use
- Historical, Architectural, Archeological, and Cultural Resources
- Department of Transportation Act Section 4(f) Properties
- Biological Resources
- Airspace

3.2 AIR QUALITY

3.2.1 Definition of Resource and Regulatory Setting

Air quality is the measure of the condition of the air expressed in terms of ambient pollutant concentrations and their temporal and spatial distribution. Air quality regulations in the United States are based on concerns that high concentrations of air pollutants can harm human health, especially for children, the elderly, and people with compromised health conditions; as well as adversely affect public welfare by damage to crops, vegetation, buildings, and other property.

3.2.1.1 National Ambient Air Quality Standards (NAAQS)

Under the CAA, the U.S. Environmental Protection Agency (USEPA) developed the NAAQS for seven criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter $\leq$10 microns in diameter and >2.5 microns in diameter (PM_{10}), particulate matter $\leq$2.5 microns in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb) (USEPA 2021a). The USEPA determined that these criteria air pollutants may harm human health and the environment, and cause property damage. The USEPA regulates these pollutants to permissible levels through human health-based (primary standards) and environmental-based (secondary standards) criteria. The state and national ambient air quality standards are provided in Table 3.2-1.

Table 3.2-1. National and State Ambient Air Quality Standards

Pollutant	Averaging Time	Utah* and NAAQS[1]	
		Primary[2]	Secondary[3]
Ozone (O_3)	1-hour	-	Same as Primary Standard
	8-hour	0.070 ppm	
Respirable Particulate Matter (PM_{10})	24-hour	150 µg/m^3	Same as Primary Standard
Fine Particulate Matter ($PM_{2.5}$)	24-hour	35 µg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3
Carbon Monoxide (CO)	8-hour	9 ppm	None
	1-hour	35 ppm	
Nitrogen Dioxide (NO_2)	Annual Average	53 ppb	Same as Primary Standard
	1-hour	100 ppb	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean[4]	0.03 ppm	-
	24-hour[4]	0.14 ppm	-
	3-hour	-	0.5 ppm
	1-hour	75 ppb	-
Lead (Pb)	Calendar Quarter	1.5 µg/m^3	Same as Primary Standard
	3-Month Rolling Average	0.15 µg/m^3	

Notes: ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter.
*Utah has adopted all NAAQS.
[1]NAAQS (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard.
[2]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[3]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[4]The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a State Implementation Plan (SIP) call under the previous SO_2 standards (40 CFR 50.4(3)).
Source: USEPA 2022a.

Criteria air pollutants are classified as either primary or secondary pollutants based on how they are formed in the atmosphere. Primary air pollutants are emitted directly into the atmosphere from the source of the pollutant. Examples of primary pollutants are the smoke produced by burning wood and volatile organic compounds emitted by industrial solvents. Secondary air pollutants are those formed through atmospheric chemical reactions that usually involve primary air pollutants (or pollutant precursors) and normal constituents of the atmosphere. Ozone is a secondary pollutant that is formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors (volatile organic compounds, nitrogen oxides, and suspended PM_{10}). Some criteria air pollutants are a combination of primary and secondary pollutants. Particulate matter, including PM_{10} and $PM_{2.5}$, are generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. They are generated as secondary pollutants through chemical reactions or through the condensation of gaseous pollutants into fine aerosols.

Areas that exceed an NAAQS standard are designated as "nonattainment" for that pollutant, while areas in compliance with a standard are in "attainment" for that pollutant. An area may be nonattainment for some pollutants and attainment for others simultaneously. The USEPA delegates the regulation of air quality to states and U.S. territories, through their air quality management agencies, and are required to prepare and implement a State Implementation Plan (SIP) for nonattainment areas, which demonstrate how the area will meet the NAAQS. Areas that have achieved attainment may be designated as "maintenance areas," subject to maintenance plans showing how the area will continue to meet the NAAQS.

In addition to the six criteria pollutants, the USEPA currently designates 188 substances as hazardous air pollutants under the federal CAA (USEPA 2022b). Hazardous air pollutants are a class of pollutants that do not have ambient air quality standards but are examined on an individual basis when there is a source of these pollutants. Hazardous air pollutants are air pollutants known or suspected to cause cancer or other serious health effects, or adverse environmental and ecological effects. NAAQS are not established for these pollutants; however, the USEPA has developed rules and control standards that limit emissions of hazardous air pollutants from specific stationary (National Emissions Standards for Hazardous Air Pollutants) and mobile sources (Mobile Source Air Toxics). These emissions control standards are intended to achieve the maximum degree of reduction in emissions of the hazardous air pollutants, taking into consideration the cost of emissions control, non-air-quality health and environmental impacts, and energy requirements. These emissions are typically one or more orders of magnitude smaller than concurrent emissions of criteria air pollutants.

Ambient air quality is reported as the atmospheric concentrations of specific air pollutants at a particular time and location. The units of measure are expressed as a mass per unit volume (e.g., micrograms per cubic meter [$\mu g/m^3$] of air) or as a volume fraction (e.g., parts per million by volume). The ambient air pollutant concentrations measured at a particular location are determined by the pollutant emissions rate, local meteorology, and atmospheric chemistry. Wind speed and direction, the vertical temperature gradient of the atmosphere, and precipitation patterns affect the dispersal, dilution, and removal of air pollutant emissions from the atmosphere.

3.2.2 Analysis Framework

The air quality impact evaluation combines two analyses: the CAA General Conformity Analysis and an analysis under NEPA. General Conformity is concerned with ensuring that non-permitted projects conform to the SIP. The NEPA analysis is concerned with whether an activity significantly affects the human environment. The two analyses are related in that an air impact that violates a SIP is probably "significant." Generated air emissions are evaluated in one or both of the identified analysis categories based on the geographical and spatial locations where emissions occur and CAA air quality status (nonattainment, maintenance, or attainment) of those respective locations, as well as pollutants emitted, type of emission

source, and levels of emissions. The entire Proposed Action would occur within inland locations. As such, the impact of these emissions would be evaluated under the CAA General Conformity Rule for only those areas designated as nonattainment or maintenance and only for nonattainment or maintenance criteria pollutants.

Section 176(c)(1) of the CAA, known as the General Conformity Rule, requires federal agencies to ensure that their actions conform to applicable implementation plans for achieving and maintaining the NAAQS for criteria pollutants for nonattainment and maintenance areas. Federal actions are required to conform with the approved SIP for those areas of the United States designated as nonattainment or maintenance areas for any criteria air pollutants under the CAA (40 CFR Parts 51 and 93 Subpart B). The purpose of the General Conformity Rule is to ensure that applicable federal activities do not cause or contribute to new violations, do not worsen existing violations, and do not delay attainment of the NAAQS. A conformity evaluation must be completed for every applicable action that generates emissions to determine and document whether a Proposed Action complies with the General Conformity Rule. A federal action would not conform if it increased the severity of any existing violations of an air quality standard or delayed the attainment of a standard, required interim emissions reductions, or delayed any other air quality milestone.

Federal agency compliance with the General Conformity Rule can be demonstrated in several ways. The requirement can be satisfied by a determination that the Proposed Action is not subject to the General Conformity Rule with the issuance of a Record of Non-Applicability (RONA) or by a Conformity Determination. Compliance is presumed if the net increase in emissions from a federal action would be less than the relevant *de minimis* threshold. If net emissions increases exceed the *de minimis* thresholds, then a formal conformity determination must be prepared.

The first step in the Conformity evaluation is a Conformity Applicability Analysis, which involves calculating the non-exempt direct and indirect emissions associated with the action. If there is no current activity (the Proposed Action is completely new), then the sum of the non-exempt direct and indirect emissions equals the net change in emissions (the current level would be zero). If the action is a change from a current level of emissions, then future emissions are evaluated against the current level, defined as the "current environmental baseline conditions." The net change, then, is the difference between the emissions associated with the action and the current environmental baseline emissions. The net change may be positive, negative, or zero. The emissions thresholds that trigger a Conformity Determination are called *de minimis* levels. The *de minimis* levels for nonattainment and maintenance pollutants under the General Conformity Rule are shown in Table 3.2-2. For nonattainment and maintenance criteria pollutants, the conformity *de minimis* levels are useful as NEPA analysis screening thresholds to determine significance. For these pollutants, the General Conformity "*de minimis*" thresholds are identical to "major source" thresholds applicable to new stationary sources under the federal CAA.

The net change calculated for the direct and indirect emissions are compared to the de minimis levels published in the Conformity Rule. If the net change in emissions does not exceed de minimis thresholds, then a General Conformity Determination is not required, and the emissions are presumed to conform to the SIP. If the net change in emissions equal or exceed the de minimis conformity applicability threshold values, a General Conformity Determination must be prepared to demonstrate conformity with the approved SIP.

Table 3.2-2. General Conformity *de minimis* Levels

Pollutant	Area Type	Tons/year
Ozone (VOC or NO_x)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
CO, SO_2 and NO_2	All nonattainment & maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$*	All nonattainment & maintenance	100
Lead	All nonattainment & maintenance	25

Notes: NO_X = nitrogen oxides, VOC = volatile organic compound. *=There are four main $PM_{2.5}$ precursor pollutants: SO_2, NO_x, VOCs, and ammonia (NH_3).
Source: 40 CFR 93.153(b)(1-2).

3.2.3 Region of Influence (ROI)

The proposed RLR operations that would utilize surface vehicles and aircraft would be located entirely within Tooele County, Utah. Therefore, for the purposes of this air quality analysis, the ROI for the Proposed Action and No-Action Alternative includes Tooele County. Proposed helicopter operations of concern are those that occur from ground level up to 3,000 ft above ground level (AGL). The 3,000 ft AGL altitude was assumed to be the ceiling of the mixing zone (known as the atmospheric mixing height) above which any pollutant generated would not contribute to increased pollutant concentrations at ground level. Pollutants emitted by aircraft above 3,000 ft AGL are excluded from the analysis of compliance with NAAQS. See Appendix B, Section B.1.3 for further details.

3.2.4 Existing Conditions

3.2.4.1 Regional Climate and Topography

Emissions associated with the Proposed Action would occur in Tooele County, Utah, which is located in the interior climate region of central/western Utah. Based on a monitoring station within UTTR for the period 1989-2016, the warmest month is July, with an average maximum temperature of 94.1 degrees Fahrenheit (°F) (34.5 degrees Celsius [°C]). The coolest month is December, with an average minimum temperature of 16.3 °F (-8.7 °C). Average total annual precipitation is 10.1 inches (25.7 centimeters [cm]). April is the wettest month, with an average of 1.3 inches (3.3 cm) of precipitation. August is the driest month, with an average of 0.4 inch (1.0 cm) of precipitation. Average annual snowfall is 15.1 inches (38.4 cm). The most snow falls in January, with an average of 5.9 inches (15.0 cm) (Western Regional Climate Center 2022).

UTTR South and DPG lie within the Great Salt Lake Desert of the Basin and Range physiographic province. The area is characterized by variable desert terrain that includes sand dunes and foothills at the base of mountains rising abruptly from the desert floor to elevations of more than 6,000 ft MSL. Within UTTR South and DPG, the terrain is generally quite flat, as it is the remnant of the Pleistocene-aged Lake Bonneville. The only area within the proposed landing area that has significant elevation is Wildcat Mountain, rising approximately 1,000 ft above the dry lake bed and located just inside the eastern boundary of the proposed landing area within UTTR South.

3.2.4.2 Air Quality

Tooele County emissions data were obtained from the 2021 annual report of Utah's air quality (Table 3.2-3) (Utah Department of Environmental Quality 2022). The county data include emission amounts from point sources, area sources, and mobile sources. *Point sources* are stationary sources that can be identified by name and location. *Area sources* are point sources from which emissions are too low to track individually (e.g., a home or small office building) or a diffuse stationary source (e.g., wildfires or agricultural tilling). *Mobile sources* are any kind of vehicle or equipment with a gasoline- or diesel-powered engine. Two types of mobile sources are considered: on-road and non-road. On-road sources include vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Non-road sources include aircraft, locomotives, diesel- and gasoline-powered boats, personal watercraft, lawn and garden equipment, agricultural and construction equipment, utility terrain vehicles (UTVs), and recreational vehicles.

Portions of Tooele County are in serious nonattainment for $PM_{2.5}$ (2006 standard), marginal nonattainment for ozone (2015 8-hour standard), and nonattainment for SO_2 (1971 standard) (USEPA 2022c).

Table 3.2-3. Baseline Criteria Pollutant Emissions Inventory for Tooele County, Utah

Criteria Pollutant (tons/year)					
CO	**NO_x**	**VOCs**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
33,952	5,775	48,353	203	7,646	2,681

Notes: NO_X = nitrogen oxides, VOCs = volatile organic compounds.
Source: Utah Department of Environmental Quality 2022.

3.2.5 Environmental Consequences

Effects on air quality are based on estimated direct and indirect emissions associated with the Proposed Action. Air quality impacts would be significant if the action would cause pollutant concentrations to exceed one or more of the NAAQS, as established by the USEPA under the CAA, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.

Emission factors and schedules for operations were used to calculate total values of each emission type that would be emitted under the Proposed Action. An emission factor represents the mass of a pollutant released into the atmosphere by a given source over a specified period of time. Emission factors can vary considerably depending on type of source, time of day, and schedule of operation. For the Proposed Action, only small quantities of hazardous air pollutants are expected to be emitted with very low potential exposure and health risk. A quantitative evaluation of hazardous air pollutant emissions is therefore not warranted and was not conducted. Emissions of Criteria Pollutant were compared to *de minimis* levels to ensure that the project meets the CAA General Conformity Rule requirements.

3.2.5.1 Proposed Action

Under the Proposed Action, Varda would conduct four RLR operations within UTTR South/DPG North during the period 2023-2025. Appendix B (*Air Quality Methodology and Calculations*) contains a detailed description of methodologies, assumptions, and emission factors used to calculate the emissions from those activities associated with the Proposed Action with the potential to impact regional air quality. The regional climate and topographical conditions would not hinder dispersal of air pollutant emissions in the ROI (see Section 3.2.4.1). Table 3.2-4 summarizes the total emissions associated with the Proposed Action.

Table 3.2-4. Estimated Total Air Emissions for the Proposed Action (2023-2025)

Emission Source	Criteria and Precursor Air Pollutant Emissions (tons)					
	VOCs	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Vehicle – Combustion	0.130	0.04	0.070	0.0040	0.0040	0.0040
Aircraft	0.005	0.03	0.002	0.0008	0.0005	0.0005
Aircraft – Dust					0.0500	0.0030
Total	**0.135**	**0.07**	**0.072**	**0.0048**	**0.0545**	**0.0075**
General Conformity Nonattainment/ Maintenance *de minimis* Levels	50	100	100	100	100	100
Exceeds *de minimis* Level?	**No**	**No**	**No**	**No**	**No**	**No**

Notes: n/a = not applicable; SO_x = sulfide oxides.

General Conformity

As shown in Table 3.2-4, the estimated emission increase due to implementation of the Proposed Action is below the applicable General Conformity *de minimis* levels. As such, a General Conformity Determination is not required. A RONA was prepared and is included in Appendix B (*Air Quality Methodology and Calculations*).

Impacts from Criteria Pollutants

The General Conformity analysis presented above satisfies the NEPA analysis. As shown in Table 3.2-4, the estimated emissions for the Proposed Action are well below the applicable General Conformity *de minimis* levels and Prevention of Significant Deterioration major thresholds used as screening level thresholds of significance.

Airspace Closures. Airspace closures associated with commercial space operations may potentially result in additional aircraft emissions mainly from aircraft being re-routed and expending more fuel. Minimal, if any, additional emissions would be generated from aircraft departure delays because the FAA rarely receives reportable departure delays associated with commercial space operations. Airspace closures as a result of the Proposed Action could occur up to a maximum of two times per year (i.e., or a maximum of four operations during 2023-2025). Although the additional air emissions from potential delays or rerouting of aircraft was not calculated, only two reentry operations per year would be conducted that would require airspace closures lasting approx. 16 mins each. These closures that may or may not result in rerouting or delays of aircraft and associated emissions would be considered insignificant given the level of flight activity within the ROI (e.g., Hill AFB, Salt Lake City International Airport). Thus, any delays in aircraft departures from affected airports would be short-term and any increases in air emissions from grounded aircraft are expected to be minimal. Further, it is likely that a grounded aircraft would not have its engines idling during such a foreseeable delay, further minimizing increases in air emissions. Therefore, these emissions increases are not expected to result in an exceedance of a NAAQS for any criteria pollutant. Emissions from aircraft being re-routed would occur above 3,000 ft AGL (the mixing layer) and thus would not affect ambient air quality. Therefore, these increases in emissions are not expected to result in an exceedance of the NAAQS for any criteria pollutant and would not result in significant air quality impacts.

3.2.5.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South would not occur. Consequently, baseline conditions, as described in Section 3.2.4 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to regional air quality with implementation of the No-Action Alternative.

3.3 CLIMATE

3.3.1 Definition of Resource and Regulatory Setting

Climate change is a global phenomenon that can have local impacts. Scientific measurements show that Earth's climate is warming, with concurrent impacts including warmer air temperatures, increased sea level rise, increased storm activity, and an increased intensity in precipitation events. Research has shown there is a direct correlation between fuel combustion and greenhouse gas (GHG) emissions. GHGs are defined as including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). CO_2 is the most important anthropogenic GHG because it is a long-lived gas that remains in the atmosphere for up to 100 years (USEPA 2022e).

GHGs have varying global warming potential (GWP). The GWP is the potential of a gas or aerosol to trap heat in the atmosphere; it is a measure of the total energy the emissions of 1 ton of gas will absorb over a given period of time (usually 100 years), compared to the emissions of 1 ton of CO_2 (USEPA 2022d). The reference gas for GWP is CO_2; therefore, CO_2 has a GWP of 1. The other main GHGs that have been attributed to human activity include CH_4, which has a GWP of 28, and N_2O, which has a GWP of 265 (Myhre *et al*. 2013). CO_2, followed by CH_4 and N_2O, are the most common GHGs that result from human activity. CO_2, and to a lesser extent, CH_4 and N_2O, are products of combustion and are generated from stationary combustion sources as well as vehicles. The following formula is used to calculate the Carbon Dioxide Equivalent (CO_2e):

$$CO_2e = (CO_2 \times 1) + (CH_4 \times 28) + (N_2O \times 265)$$

The FAA has developed guidance for considering GHGs and climate under NEPA, as published in the Desk Reference to Order 1050.1F (FAA 2020b). An FAA NEPA review should follow the basic procedure of considering the potential incremental change in CO_2 emissions that would result from the proposed action and alternative(s) compared to the No-Action Alternative for the same timeframe and discussing the context for interpreting and understanding the potential changes. For such reviews, this consideration could be qualitative (e.g., explanatory text), but may also include quantitative data (e.g., calculations of estimated project emissions).[(1)] However, at present, no methodology exists that would enable estimating the specific impacts (if any) that this change in GHGs would produce locally or globally.

Activities conducted as part of the Proposed Action would involve mobile sources using fossil fuel combustion as a source of power (e.g., diesel-fueled equipment and vehicles), which results in generation of GHG emissions. These emissions are quantified primarily using methods elaborated upon in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2020* (USEPA 2022f) for the Proposed Action, and estimates are presented in the Environmental Consequences section. GHG emissions for the Proposed Action are provided as required by the CEQ's *Final Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change* (CEQ 2016).

3.3.2 Region of Influence (ROI)

GHG emissions for this project are considered globally since climate change is a global issue. This means GHG emissions are considered for all emissions sources and at all altitudes for recovery aircraft.

3.3.3 Existing Conditions

In 2021, U.S. GHG emissions totaled an estimated 6,348 million metric tons (MT) of CO_2e. This 2021 total represents a 16.3% decrease since 2005 (USEPA 2023). Transportation activities accounted for 29% of U.S. GHG emissions from fossil fuel combustion in 2021. The largest sources of transportation GHG emissions in 2021 were light-duty vehicles (including passenger cars and light-duty trucks) (57.5%),

[(1)]This analysis is consistent with EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, 86 Federal Register 7037 (January 25, 2021).

medium- and heavy-duty trucks (23.3%), commercial aircraft (5%), other aircraft (4%), and other sources (8.1%) (USEPA 2023).

Based on the most current GHG data for Tooele County, Utah, GHG emissions for 2020 totaled 431,523 MT of CO_2e (USEPA 2021b). This value is based only on emissions from large facilities (e.g., power plants) and does not include other sources such as transportation.

3.3.4 Environmental Consequences

The FAA and DAF have not established a significance threshold for climate, nor have they identified specific factors to consider in making a significance determination for GHG emissions. There are currently no accepted methods of determining significance applicable to commercial space projects given the small percentage of global GHG emissions they contribute. There is a considerable amount of ongoing scientific research to improve understanding of global climate change, and the guidance will evolve as the science matures or if new federal requirements are established.

3.3.4.1 Proposed Action

The projected increase in GHG emissions from the Proposed Action is discussed in the context of national and global emissions from all sources. Implementation of the Proposed Action would contribute directly to emissions of GHGs from the combustion of fossil fuels. The proposed four RLR operations would produce 10.68 MT of CO_2e from 2023 through 2025 (Table 3.3-1), as detailed in Appendix B (*Air Quality Methodology and Calculations*). These relatively insignificant GHG emissions would not likely contribute to global warming to any discernible extent. Additionally, possible increases in GHG emissions caused by short-term airspace closures (e.g., from re-routed or grounded aircraft) during commercial space operations are not expected to result in significant climate-related impacts and therefore were not calculated for the Proposed Action.

Table 3.3-1. Projected Total GHG Emissions under the Proposed Action (2023-2025)

Emission Source	$C0_2e$ Emissions (MT)
GHG Emissions of Surface Vehicles	8.28
GHG Emissions of Aircraft	2.40
Total GHG Emissions for 4 RLR Operations	**10.68**

3.3.4.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South and northern DPG would not occur. Consequently, baseline conditions, as described in Section 3.3.3 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to climate with implementation of the No-Action Alternative.

3.4 Noise and Noise-Compatible Land Use

3.4.1 Definition of Resource and Regulatory Setting

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by an auditory receiver, the ear. How the receiver (e.g., human or wildlife species) of a sound reacts depends largely on the receiver's activity at the time of exposure, experience, and attitude toward the source of the sound.

Noise is defined as unwanted or annoying sound that interferes with or disrupts normal activities, such as eating, sleeping, or communication. The response of different individuals to similar noise events is diverse and is influenced by the type of noise, perceived importance of the noise, its appropriateness in the setting, time of day, type of activity during which the noise occurs, and sensitivity of the individual receiving the noise. Noise sources can be constant or of short duration and contain a wide range of frequency (pitch)

content. Determining the character and level of sound aids in predicting the way it is perceived. Noise associated with aircraft takeoffs and landings, and sonic booms are classified as short-duration events.

The measurement and perception of sound involves three basic physical characteristics:

- Intensity – the acoustic energy, which is expressed in terms of sound pressure, in decibels (dB).
- Frequency – the number of cycles per second the air vibrates, in hertz (Hz).
- Duration – the length of time the sound can be detected.

The dB is measured on a logarithmic scale and its values are referred to generally as 'sound levels'. A sound level of 0 dB is the lower threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels ranging from 130 to 140 dB are toward the upper threshold and are felt as pain (Berglund and Lindvall 1995).

All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or Hz. To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an 'A-weighted' scale, which places less weight on very low and very high frequencies to replicate human hearing sensitivity. The general range of human hearing is from 20 to 20,000 Hz; humans hear best in the range of 1,000–4,000 Hz. A-weighting is a frequency-dependent adjustment of sound level used to approximate the natural range and sensitivity of the human auditory system. As terrestrial wildlife species generally have a similar hearing range as that of humans, the A-weighted decibel level (dBA) is commonly used to assess effects on terrestrial mammals (not including bats) and birds.

A *sonic boom* is an impulsive sound similar to thunder and is associated with the shock waves created by a vehicle traveling through air faster than the speed of sound. The boom forms a cone that trails behind the vehicle and where that cone intersects the surface of the Earth is usually called a sonic boom "carpet" under the vehicle's trajectory. The duration of a sonic boom is brief (less than 1 second), and the intensity and width of a sonic boom path, as well as the potential for the boom to intercept the surface of the earth, depends on the physical characteristics of the vehicle (size, shape, and weight), how it is operated (trajectory and speed), and the atmospheric conditions at the time. In general, the greater a vehicle's altitude, the lower the overpressure on the Earth's surface. Greater altitude also increases the boom's lateral spread, exposing a wider area to the boom. Overpressures in the sonic boom impact area, however, will not be uniform. The sonic boom levels vary along the lateral extent of the "carpet" with the highest levels directly underneath the flight track and weakens as distance from the flight track increases.

The peak pressure or intensity of the front shock wave of a sonic boom is quantified with physical pressure units (pounds per square foot [psf]) rather than levels. This additional pressure above normal atmospheric pressure is called overpressure. The change in air pressure associated with a sonic boom is only a few psf greater than normal atmospheric pressure. This is about the same pressure change experienced by a change in elevation of 20-30 ft or riding an elevator down 2 to 3 floors. It is the sudden onset of the pressure change that makes the sonic boom audible. Overpressures >1.5 psf generally elicit public reaction (NASA 2017).

The compatibility of existing and planned land uses with proposed FAA actions is usually determined in relation to the level of aircraft, launch vehicle, or reentry vehicle noise. Federal compatible land use guidelines for a variety of land uses are provided in Table 1 in Appendix A of 14 CFR Part 150, *Land Use Compatibility with Yearly Day-Night Average Sound Levels*.

3.4.1.1 Noise Metrics

Day-Night Average Sound Level (DNL)

The DNL metric is the energy-averaged sound level measured over a 24-hour period, with a 10 dB nighttime adjustment to account for heightened human sensitivity to noise when ambient sound levels are low, such as when sleep disturbance could occur. DNL values are average quantities, mathematically representing the continuous sound level that would be present if all of the variations in sound level that occur over a 24-hour period were averaged to have the same total sound energy. The DNL metric quantifies the total sound energy received and therefore represents a cumulative or long-term measure, but it does not provide specific information on the number of noise events or the individual sound levels that occur during the 24-hour day.

For sound sources that are impulsive in nature and less than 1 second in duration (e.g., sonic booms), C-weighted sound levels are used and are reported with the metric of C-weighted DNL (CDNL). "C-weighted" denotes an adjustment to the frequency content of a noise event to represent human response to louder noise levels. Compared to A-weighting, C-weighting enhances the lower frequency content.

Additionally, community annoyance from impulsive noise can be assessed using CDNL. The relationship between CDNL and annoyance has been estimated, based on community reaction to impulsive noises over several years (Federal Interagency Committee on Noise 1992). Whereas occupational sound levels are assessed in terms of hearing loss, environmental sound levels are assessed in terms of their potential to interfere with personal, workplace, and community activities, and in terms of their potential to annoy occupants of nearby land uses. In addition, the DoD's Noise Working Group indicates that the effects of impulse noises (e.g., sonic booms) should be determined based on C-weighted DNL (DoD 2013). Table 3.4-1 provides a summary of compatibility with residential/noise-sensitive land uses based upon the CDNL noise levels.

Table 3.4-1. Compatibility Levels for Impulsive Noise Sources Day-Night Levels

CDNL	Compatibility with Residential/Noise-Sensitive Land Uses
<62 dBC	Compatible
62–70 dBC	Normally Incompatible
>70 dBC	Incompatible

Notes: CDNL = C-weighted day-night average sound level; dBC = C-weighted decibels.
Source: U.S. Army 2005.

Peak Sound Level (L_{pk})

For impulsive sounds, such as a sonic boom that only lasts for a fraction of a second, the true instantaneous peak sound pressure level is important for assessing potential effects on wildlife. The peak pressure or intensity of the front shock wave is used to describe sonic booms and it is usually presented in psf. Peak sound levels are not frequency weighted.

3.4.2 Noise Modelling of Varda Capsule Reentry Operations

To determine the potential for a sonic boom, the modelling program PCBoom was used. PCBoom is an acoustic modelling program developed by Wyle, Inc. in response to the need for a sonic boom model suitable for environmental analysis of commercial space vehicles and operations. For the current analysis, PCBoom version 4.99 was used and will be referred to simply as PCBoom hereafter. PCBoom is used to predict the peak overpressures and impact locations of a potential sonic boom generated by the Varda capsule during reentry. During reentry and its descent from orbit, the Varda capsule exceeds the speed of sound (i.e., becomes supersonic) and produces a sonic boom. PCBoom considers the size and shape of the vehicle and the trajectory in relationship to the thrust, drag, and weight of the vehicle, which vary during the flight of the vehicle, to estimate the initial signature of the overpressure.

PCBoom propagates the overpressure through site and seasonally specific meteorological conditions obtained from a 10-year rawinsonde database profile. A rawinsonde is a method of upper air observation consisting of an evaluation of the wind speed and direction, temperature, pressure, and relative humidity aloft by means of a balloon-borne radiosonde tracked by a radar or radio direction finder. The 10-year rawinsonde database is queried for data available for dates surrounding the proposed reentry date and approximately 120 meteorological conditions (each representing a single day in the database) are graphically presented. The data profile includes the high wind, low wind, low temperature, high temperature, and median profiles sampled evenly throughout each month of the year. Between 30 and 35 individual meteorological profiles are selected, which encompasses the range of potential conditions that could be encountered near the proposed reentry date. In addition, the meteorological condition that lies nearest the center of distribution is noted as the median profile. The PCBoom model is run for each meteorological profile and the results of each PCBoom run is projected within geographic information system (GIS) as a scatterplot to illustrate the potential variance of boom locations. The median meteorological profile is also projected and contours (using psf as the interval) are generated to show the most "likely" sonic boom footprint.

PCBoom has been used for numerous environmental documents, including EAs, EISs, and to fulfil pre-launch monitoring requirements. It is the only sonic boom modelling program approved by the FAA to support the environmental review of commercial space operations and associated licenses (FAA 2020b).

3.4.3 Region of Influence (ROI)

The ROI for noise includes those areas potentially subject to sonic booms during the proposed reentry of the Varda capsule into UTTR South and northern DPG.

3.4.4 Existing Conditions

Noise associated with current activities occurring at UTTR and DPG are generally intermittent and associated with Army training activities such as artillery and mortar fire, small-arms fire, movement of land-based vehicles (both military and construction), detonation of explosives, and Air Force aircraft overflights conducting air-to-air combat training and air-to-ground bombing and gunnery training. UTTR is also the only location capable of supporting overland testing of cruise missiles. Aircraft noise is prevalent throughout UTTR and DPG and is the most significant source. Numerous DoD and contracted aircraft use the restricted airspace overlying UTTR South and DPG (e.g., F-16, F-35, F-22, A-10, B-1, B-52, and a variety of helicopters and unmanned aircraft vehicles) (DAF 2013; Callister *et al*. 2020). Depending on the type of aircraft and mission, a wide range of noise levels (frequencies and loudness) can be generated, including sonic booms generated by supersonic flights (flights greater than the speed of sound [Mach 1]). The DNL in the UTTR airspace is estimated to be approximately 60 dB (DAF 2013). UTTR supports more than 30 multi-week test and evaluation events per year, with an annual average of 10,000 training sorties and 300 test and evaluation sorties (JT4 2021; Hill AFB 2022). Due to the large size of UTTR, most people not on the site would hear these noises as infrequent distant muffled sounds.

Noise-sensitive land uses within the ROI include the Fish Springs National Wildlife Refuge (NWR), Deseret Peak Wilderness/Uinta-Wasatch-Cache National Forest, The Confederated Tribes of Goshute Indian Reservation, and Skull Valley Indian Reservation (Figure 3.4-1).

3.4.5 Environmental Consequences

3.4.5.1 Proposed Action

Varda Capsule Reentry Operations

During reentry, the Varda capsule would generate a sonic boom as it travels along its flight path or trajectory (Figure 3.4-1). The sonic boom would be centered over UTTR South and would extend to the surrounding areas. Based on the PCBoom modeling results, the highest sonic boom level below the proposed capsule

reentry trajectory would be 0.04 psf and would occur almost completely within the boundaries of UTTR South (Figure 3.4-1). Lesser sonic boom psf levels would occur in the surrounding areas including levels of 0.01 psf approximately 40 miles south and 125 miles northeast of UTTR South.

Table 3.4-2 provides a summary of sonic boom levels from the Varda capsule during reentry and an F-35 aircraft in terms of psf, L_{pk}, and CDNL metrics. F-35 aircraft are a common aircraft that utilize UTTR and the associated airspace. For context, the received L_{pk} of 127.6 dB from an F-35 jet is approximately 16 times louder than the Varda capsule during reentry at 87.6 dB L_{pk}.

Table 3.4-2. Comparison of Sonic Boom Levels from the Proposed Varda Capsule and an F-35 Jet

Source	Sonic Boom Levels		
	psf	L_{pk} (dB)*	CDNL (dB)
Varda Capsule during Reentry	0.01	87.6	12.2
	0.02	93.6	18.2
	0.03	97.1	21.7
	0.04	99.6	24.2
F-35 jet at 30,000 ft MSL	1	127.6	52.2
	2	133.6	58.2

Note: *unweighted noise level.

Table 3.4-3 summarizes the received sound levels at sensitive land uses within the ROI from the Varda capsule on reentry. For the purposes of this analysis, sensitive land uses include an NWR, a National Forest and two Indian Reservations.

Table 3.4-3. Received Sonic Boom Levels (psf and CDNL) at Sensitive Land Use Areas underlying the Varda Capsule Reentry Sonic Boom Contours

Sensitive Land Use Area*	Received Sonic Boom Level	
	psf	CDNL
Fish Springs NWR	0.01	12.2
The Confederated Tribes of Goshute Indian Reservation	0.01	12.2
Skull Valley Indian Reservation	0.02	18.2
Deseret Peak Wilderness/Uinta-Wasatch-Cache National Forest	0.02	18.2

Note: See Figure 3.4-1 for the location of these areas and sonic boom contours.

Proposed Varda reentry operations would occur on the proposed trajectory a maximum of two times per year (i.e., or a maximum of four operations during 2023-2025). Therefore, there would be a maximum of two very low-level sonic booms per year along the capsule reentry trajectory over UTTR South and northern DPG and the surrounding area during the period of 2023 through 2025. However, a sonic boom of maximum level of 0.04 psf would be unlikely to even be detected on the ground as the sound level would be significantly less than that of a distant thunderstorm and would probably not be discernable from other ambient noise sources. Each year Tooele County experiences approximately 22 thunderstorms (National Oceanic and Atmospheric Administration 2022), which register at 1 psf. In addition, the proposed capsule reentry trajectory and associated sonic boom area within UTTR South and DPG underlies restricted military airspace where permitted supersonic operations occur.

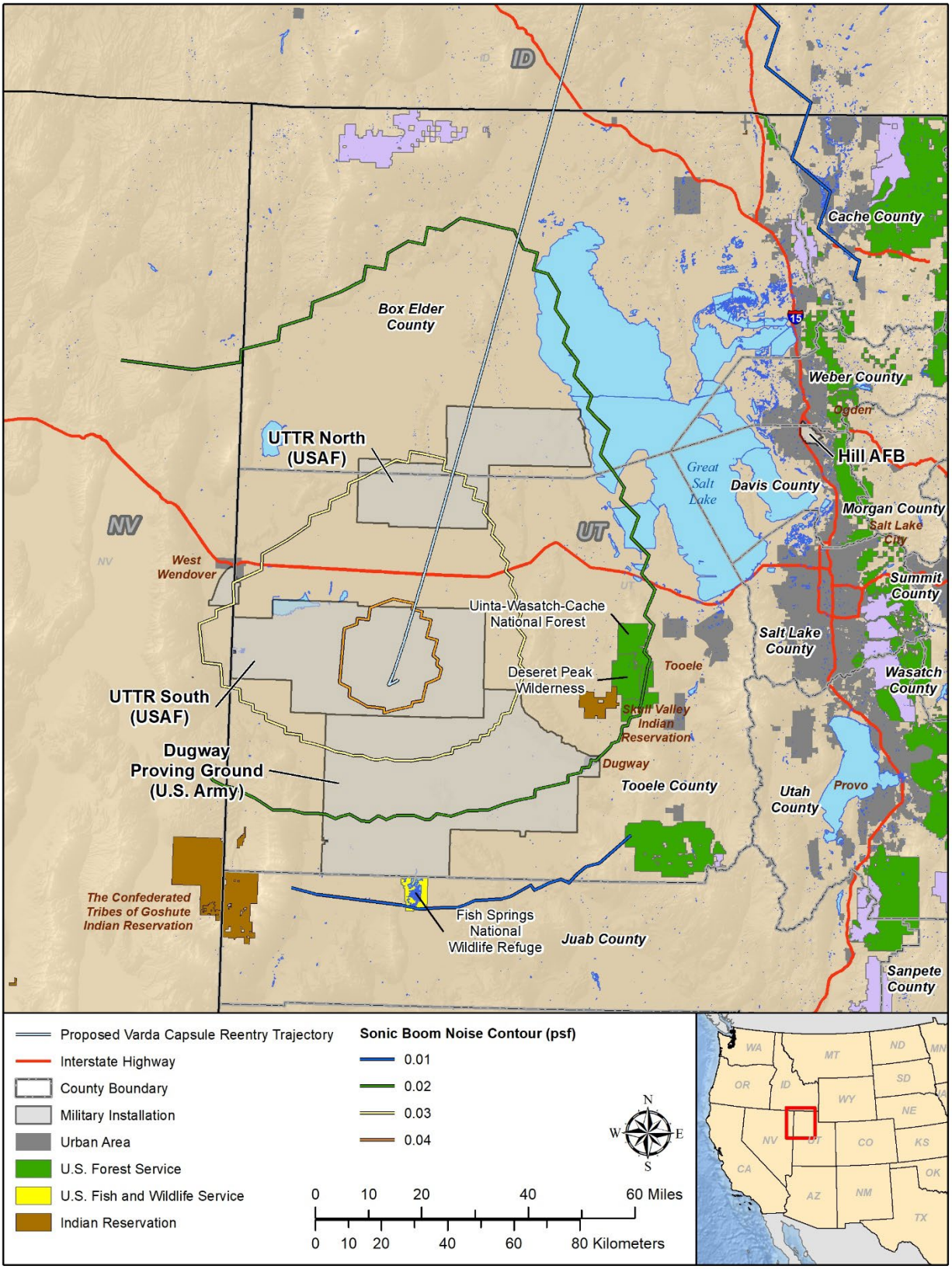


Figure 3.4-1. Modelled Sonic Boom Levels from the Proposed Reentry of the Varda Capsule to UTTR South and Northern DPG

A sonic boom at 0.01 and 0.02 psf that would be received at the NWR, National Forest, The Confederated Tribes of Goshute Indian Reservation and Skull Valley Indian Reservation would also be unlikely to be noticed from background ambient activities that would be occurring at the time of any sonic boom from the Varda capsule upon reentry. With respect to a received sonic boom of 0.02 psf or less, for context, thunder overpressure resulting from lightning strikes at a distance of 0.6 mile is estimated to be 2 psf (FAA 2002). Therefore, proposed Varda reentry operations and associated sonic booms would not result in significant impacts to the regional noise environment in the vicinity of UTTR South and DPG, including noise sensitive land uses such as an NWR, National Forest, and two Indian Reservations within the ROI.

Proposed Varda Capsule Recovery Operations

Short-term and infrequent noise from the proposed helicopter operations used during capsule recovery activities would not differ significantly from baseline conditions within UTTR South and northern DPG and are therefore not expected to result in any significant changes in the regional noise environment.

Airspace Closures

Airspace closures associated with commercial space operations could result in temporarily grounded aircraft at affected airports and re-routing of en-route flights on established alternate flight paths. As noted previously, the FAA rarely receives reportable departure delays associated with commercial space operations. If aircraft were grounded because of temporary airspace closures from proposed reentry activities, noise levels at the airport could temporarily increase as the planes sit idle. However, increased noise from grounded aircraft occurs for many reasons beyond reentry operations, including weather, equipment outages, military operations, and traffic volume. Since RLR operations would occur no more than two times per year, which typically is far less frequent than all other sources of delays, the effect would be negligible. Also, depending on the altitude at which aircraft approach an airport, there could be temporary increases in noise levels in communities around an airport. However, all aircraft re-routing in response to commercial space operations would occur along established alternative routes according to existing flight procedures that have already undergone environmental review and are the same flight paths that are used for other re-route reasons, such as weather issues, runway closures, military exercises, among others. Re-routing associated with reentry-related closures represents a small fraction of the total amount of re-routing that occurs from all other reasons in any given year. Any incremental increases in noise levels at an individual airport would only last the duration of the airspace closure on a periodic basis and are not expected to meaningfully change existing day-night average sound levels at the affected airports and surrounding areas. Therefore, airspace closures due to proposed Varda reentry operations within UTTR South and northern DPG are not expected to result in significant noise impacts.

3.4.5.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South and northern DPG would not occur. Consequently, baseline conditions, as described in Section 3.4.4 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to the regional noise environment with implementation of the No-Action Alternative.

3.5 HISTORICAL, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

3.5.1 Definition of Resource and Regulatory Setting

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural resources.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., tools, arrowheads, or bottles). "Prehistoric" refers to resources that predate the advent of written records in a region. These resources can range from a scatter composed of a few artifacts to village sites and rock art. "Historic" refers to resources that postdate the advent of written records in a region. Archaeological resources can include, but are not limited to, campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features. *Architectural resources* include, but are not limited to, standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for protection under existing cultural resource laws. However, more recent structures, such as Cold War era military buildings, may warrant protection if they have the potential to be historically significant structures. Architectural resources must also possess integrity (its important historic features must be present and recognizable). *Traditional cultural resources* can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other groups consider essential for the continuance of traditional cultures.

Only significant cultural resources, known or unknown, warrant consideration with regard to adverse impacts resulting from a proposed action. To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion in the National Register of Historic Places (NRHP).

There are no legally established criteria for assessing the importance of a traditional cultural resource. These criteria must be established primarily through consultation with Native Americans, in accordance with the requirements of the NHPA. Section 106 of the NHPA requires a federal agency to consider the effects of its action (referred to as the *undertaking*) on historic properties. Compliance with Section 106 requires consultation with the State Historic Preservation Officer (SHPO) and other parties, including Indian tribes. The Section 106 process is outlined in 36 CFR Part 800. Major steps in the process include identifying the Area of Potential Effect (APE) in consultation with the SHPO, identifying and evaluating any historic properties within the APE, and assessing the effect of the undertaking on any historic properties. If a historic property would be adversely affected, the consultation process includes resolution of adverse effects. When applicable, consultation with other affected groups provides the means to establish the importance of their traditional resources. This can also be accomplished using 36 CFR 60.4 and Advisory Council on Historic Preservation (ACHP) Guidelines. Additionally, cultural resources are protected under the Archaeological Resource Protection Act (16 U.S.C. 470aa-470mm). The Native American Graves Protection and Repatriation Act defines the procedures for consultation and treatment of Native American burials and burial artifacts.

3.5.2 Area of Potential Effect (APE)

The APE of an undertaking is defined at 36 CFR § 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." For the purposes of this EA, the APE is defined as:

- the proposed Varda capsule landing area within UTTR South and DPG that would be subject to capsule recovery operations by personnel via helicopter (Figure 3.5-1), and
- the area of the sonic boom associated with the capsule reentry and the associated noise that may potentially result in indirect effects to historic properties (Figure 3.4-1).

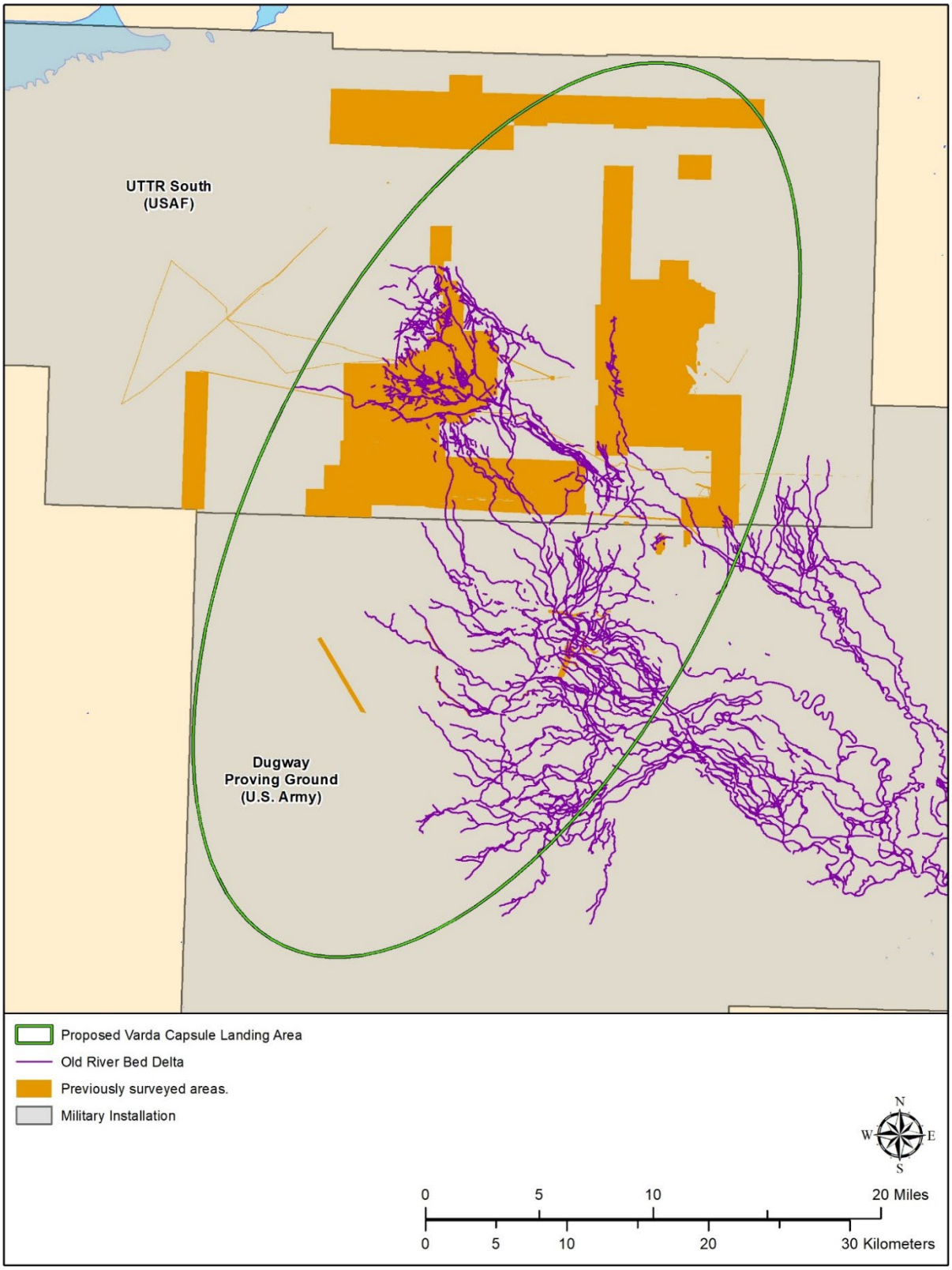


Figure 3.5-1. Summary of Cultural Resources Inventoried Areas on UTTR South and Northern DPG

(*Sources*: Air Force Civil Engineer Center (AFCEC) 2022; DPG 2022)

3.5.3 Existing Conditions

3.5.3.1 Regional Cultural Context

Prehistoric Period

People have been a part of the Great Salt Lake Desert landscape and UTTR/DPG for more than 13,000 years. The earliest inhabitants of the eastern Great Basin appear to have been restricted to lake-margin habitats. Great Basin peoples have lived primarily as mobile hunter-gatherers throughout prehistory, adapting through time to changing environmental conditions and population densities. The earliest Great Basin inhabitants living on the Old River Bed delta dominate the archaeology of UTTR and DPG (Callister *et al*. 2020; Hill AFB 2021).

UTTR South and DPG are on the aboriginal lands of 21 federally recognized Native American tribes around and near Pi'a-pa (the Great Salt Lake) and Pi'-avwa-go-she To'-yap (the Wasatch Mountains) (Callister *et al*. 2020; Hill AFB 2021).

- Blackfeet Tribe
- Confederated Tribes of the Goshute Indian Reservation
- Crow Nation
- Duckwater Shoshone Tribe
- Eastern Shoshone Tribe
- Ely Shoshone Tribe
- Hopi Indian Tribe
- Navajo Nation
- Northern Arapaho Tribe
- Northwestern Band of the Shoshone Nation
- Paiute Indian Tribe of Utah (Koosharem Band, Shivwits Band, Kanosh Band, Indian Peaks Band, Cedar Band)
- Pueblo of Zuni
- San Juan Southern Paiute Tribe
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Shoshone-Paiute Tribes of the Duck Valley Reservation
- Skull Valley Band of Goshute Indians
- Te-Moak Tribe of Western Shoshone
- Ute Indian Tribe
- Ute Mountain Tribe
- Wells Band of Western Shoshone
- Confederated Salish & Kootenai Tribes of the Flathead Nation

Historic Period

Major periods and events in the non-native history of Utah include early Euro-American exploration and immigration, fur trapping, westward migration and subsequent displacement of American Indian populations, the Gold Rush and other mining, expansion of the railroads, the Great Depression, and the increasingly prominent military presence during and after World War II, through the Cold War, until the present (Callister *et al*. 2020; Hill AFB 2021).

3.5.3.2 Known Cultural Resources within the Proposed Capsule Landing Area on UTTR South and Wendover Airport

As of 2022, cultural resources surveys, inventories, and assessments have been conducted on 83,064 acres within the proposed Varda capsule landing area on UTTR South, or only 36% of the total 229,635 acres of the proposed landing area on UTTR South (Figure 3.5-1). These surveys have identified both prehistoric and historic resources that are eligible for listing in the NRHP. Within the proposed landing area on UTTR South, 495 cultural sites (493 prehistoric and 2 historic) have been recorded. Of those, 93 are NRHP-eligible sites (AFCEC 2022) (Table 3.5-1).

Table 3.5-1. Number of Inventoried Cultural Resource Sites within the Proposed Varda Landing Area on UTTR South and Northern DPG

Class	NRHP Status	Location		Total
		UTTR South	DPG	
Prehistoric	Eligible	92	114	206
	Not Eligible	379	50	429
	Unevaluated	22	60	82
Historic	Eligible	1	1	2
	Unevaluated	0	1	1
	Not Eligible	1	0	1
Historic & Prehistoric (multi-component)	Eligible	0	1	1
Total		**495**	**227**	**722**

Sources: AFCEC 2022; DPG 2022.

The proposed staging area for the transfer of the retrieved Varda capsule to a truck would occur at Wendover Airport. The current Wendover Airport is the site of the Wendover Army Air Field which was used extensively for training of bomber squadrons during World War II and is a historic district (Hill AFB 2021).

3.5.3.3 Known Cultural Resources within the Proposed Capsule Landing Area on Northern DPG

As of 2022, cultural resources surveys, inventories, and assessments have been conducted on 1,990 acres within the proposed Varda capsule landing area on northern DPG. These surveys have identified 225 prehistoric sites: 116 of which are eligible for listing in the NRHP, 50 sites that are not eligible, and 60 sites that have not been evaluated (Table 3.5-1). In addition, 2 historic sites and 1 historic & prehistoric site have been identified, 2 of which are eligible for listing in the NRHP. However, only 1% of the total 216,612 acres of the proposed landing area on DPG has been surveyed for cultural resources (Figure 3.5-1) (DPG 2022). It is likely that additional cultural resources are present within the unsurveyed areas of the APE.

3.5.4 Environmental Consequences

The FAA and DAF have not established a significance threshold for cultural resources. For proposed activities on Army/DPG lands, an unmitigated adverse effect is considered a significant impact. Factors to consider when assessing the significance of potential impacts on cultural resources include whether the action would result in a finding of *Adverse Effect* through the NHPA Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an EIS.

3.5.4.1 Proposed Action

Capsule Recovery Activities

In accordance with Section 106 of the NHPA, Hill AFB and DPG have initiated and are in the process of conducting Section 106 consultation and government-to-government consultations with the aforementioned 21 Federally recognized Native American tribes, the Utah SHPO, the ACHP, and other entities regarding the effects of the Proposed Action to historic properties. Hill AFB and DPG have sent letters initiating Section 106 consultation with the Utah SHPO, 21 potentially interested Tribes, Utah Professional Archaeological Council, and other parties seeking comment.

In December 2022, Hill AFB, the Utah SHPO, and the ACHP finalized a Programmatic Agreement (PA) (Appendix C), which includes stipulations to assess impacts and mitigate any potential adverse effects to historic properties on UTTR South from the landing and retrieval of objects from space and high in earth's atmosphere. In accordance with the PA, all appropriate stipulations would be implemented to address potential effects of the proposed Varda capsule recovery operations on historic properties. As DPG is not a party to the PA, a separate Section 106 consultation is being conducted by DPG for the proposed Varda capsule landing and recovery operations should they occur on DPG lands. The outcome of that consultation

will be provided in the Final EA and the resulting stipulations and requirements would be implemented to minimize and avoid impacts to cultural resources on DPG lands.

Although the exact capsule landing location within UTTR South or DPG lands is not known, the modeled reentry trajectory predicts the capsule will land within the center of the capsule landing area on UTTR South (see Figure 2.1-2). To avoid and minimize potential effects to cultural resources within the proposed capsule landing area on UTTR South and northern DPG, an archaeological monitor would be present on site for all capsule recovery actions.

As proposed Varda capsule recovery operations would be conducted via helicopter, once the capsule is located, the archaeological monitor would determine the best landing area to avoid known cultural resources in the vicinity of the capsule. After disembarking the helicopter, the EOD technician would inspect the immediate vicinity for the presence of potential unexploded ordnance (UXO) or other hazards. The archaeological monitor would then review known records of cultural resources in the vicinity to determine the best route for personnel to access the capsule on foot. The EOD technician and archaeological monitor would lead the recovery team along the route to the capsule assessing the immediate area for potential UXO and observable cultural resources. If previously unrecorded cultural resources are observed, a buffer would be established, the location noted via GPS, and the resources would be avoided to the maximum extent practicable. The EOD technician would then inspect and safe the capsule prior to letting additional Recovery Team personnel approach the capsule. Once the capsule is confirmed to be safe, it would be switched into a state whereby it ceases to make any radio transmissions. These safety steps ensure that the Recovery Team may safely work on the capsule during the recovery process.

The archaeological monitor will record the location of the retrieval activities and assess effects to historic properties. If the Hill AFB or DPG Cultural Resource Manager (CRM) determines that the retrieval action on their lands (i.e., UTTR South or DPG, respectively) did not adversely affect historic properties, no further consultation is required, and an inventory report will be submitted. If either the Hill AFB CRM or DPG CRM determines that there has been an adverse effect the appropriate installation CRM will coordinate with SHPO, consulting parties, and the proponent to implement mitigation through the Standard Mitigation Treatment Measures found in Appendix C. In addition, the installation CRM, in consultation with SHPO and other consulting parties (as applicable), will determine if the landing site meets National Register eligibility criteria. If so, the site will be fully recorded as such during retrieval and clean-up activities in coordination with Varda to ensure that all security and safety measures are met. Depending on whether the Varda capsule lands on UTTR South or DPG lands, the appropriate CRM will provide a monitoring and recordation report (as applicable) to SHPO and other consulting parties. Post review discoveries will be handled in accordance with the Hill AFB and DPG Unanticipated Discovery of Archaeological Deposits protocol.

The use of the Wendover Airport as a staging area for the transfer of the Varda capsule from the recovery helicopter to a truck or van would not result in any impacts to the Wendover Army Air Field Historic District. The helicopter would only land within an approved apron, transfer the capsule to a waiting truck or van, and then depart. No facilities or infrastructure would be used or impacted by the Proposed Action.

With implementation of the measures identified in the PA between Hill AFB, the Utah SHPO, and the ACHP, which includes stipulations to assess impacts and mitigate any potential adverse effects to historic properties on UTTR South from the landing and retrieval of objects from space and high in earth's atmosphere, as well as mitigation and monitoring measures for capsule retrieval on DPG lands, there would be no significant impacts to cultural resources within the APE on UTTR South and DPG lands.

Sonic Booms

As stated above, the highest sonic boom level below the proposed capsule reentry trajectory would be 0.04 psf and would occur almost completely within the boundaries of UTTR South (Figure 3.4-1) a maximum of twice per year. Lesser sonic boom psf levels would occur in the surrounding areas including levels of 0.01 psf approximately 40 miles south and 125 miles northeast of UTTR South. Therefore, there would be a maximum of two very low-level sonic booms per year along the capsule reentry trajectory over UTTR South, northern DPG, and the surrounding area during the period of 2023 through 2025. However, a sonic boom of maximum level of 0.04 psf would be unlikely to even be detected on the ground as the sound level would be significantly less than that of a distant thunderstorm and would probably not be discernable from other ambient noise sources. Each year Tooele County experiences approximately 22 thunderstorms (National Oceanic and Atmospheric Administration 2022). In addition, the proposed capsule reentry trajectory and associated sonic boom area within UTTR South and DPG underlies restricted military airspace where permitted supersonic operations occur.

A sonic boom at 0.01 and 0.02 psf that would be received at The Confederated Tribes of Goshute Indian Reservation and Skull Valley Indian Reservation would also be unlikely to be noticed from background ambient activities that would be occurring at the time of any sonic boom from the Varda capsule upon reentry. With respect to a received sonic boom of 0.02 psf or less, for context, thunder overpressure resulting from lightning strikes at a distance of 0.6 mile is estimated to be 2 psf (FAA 2002). Therefore, proposed Varda reentry operations and associated sonic booms would not result in significant impacts to NRHP-listed and eligible properties within the APE.

3.5.4.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South and northern DPG would not occur. Consequently, baseline conditions, as described in Section 3.5.3 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to historical, architectural, archeological, and cultural resources with implementation of the No-Action Alternative.

3.6 U.S. DEPARTMENT OF TRANSPORTATION (DOT) ACT SECTION 4(F) PROPERTIES

3.6.1 Definition of Resource and Regulatory Setting

Section 4(f) of the DOT Act of 1966 (49 U.S.C. 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project requiring the use of publicly owned land off a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or land of an historic site of national, State, or local significance, only if there is no feasible and prudent alternative to the using that land and the program or project includes all possible planning to minimize harm resulting from the use. Section 4(f) protects only those historic or archeological properties that are listed, or eligible for inclusion, on the NRHP.

Section 4(f) applies only to agencies within the DOT. If the FAA is engaged with a non-DOT agency on the NEPA review of a proposed project involving Section 4(f), the FAA is responsible for Section 4(f) compliance.

3.6.2 Region of Influence (ROI)

Similar to the APE for cultural resources, for the purposes of this EA, the ROI for Section 4(f) properties is defined as:

- the proposed Varda capsule landing area within UTTR South and northern DPG that would be subject to capsule recovery operations by personnel via helicopter (Figure 3.5-1), and
- the area of the sonic boom associated with the capsule reentry and the associated noise that may potentially result in indirect effects to historic properties (Figure 3.4-1).

3.6.3 Existing Conditions

Within the proposed Varda capsule landing area there are 209 NRHP-eligible sites that are considered Section 4(f) properties: 93 on UTTR South and 116 on northern DPG (AFCEC 2022) (Table 3.5-1). Outside of the proposed capsule landing area and underlying the modeled sonic boom contours, the closest Section 4(f) properties to the proposed Varda capsule reentry trajectory are Fish Springs NWR approximately 37 miles to the south and the Unita-Wasatch-Cache National Forest/Deseret Peak Wilderness approximately 45 miles to the east (Figure 3.4-1).

3.6.4 Environmental Consequences

3.6.4.1 Proposed Action

Given their distance from the capsule reentry trajectory, the Fish Springs NWR and Unita-Wasatch-Cache National Forest/Deseret Peak Wilderness would experience a sonic boom from the proposed capsule reentry of only 0.01-0.02 psf (Table 3.6-1).

Table 3.6-1. Received Sonic Boom Levels (psf and CDNL) at Section 4(f) Properties underlying the Varda Capsule Reentry Sonic Boom Contours

Sensitive Land Use Area*	Received Sonic Boom Level	
	psf	CDNL
Fish Springs NWR	0.01	12.2
Deseret Peak Wilderness/Uinta-Wasatch-Cache National Forest	0.02	18.2

Note: See Figure 3.4-1 for the location of these areas and sonic boom contours.

A sonic boom at 0.01 and 0.02 psf that would be received at the NWR and National Forest, respectively, would be unlikely to be noticed from background ambient activities that would be occurring at the time of any sonic boom from the Varda capsule upon reentry. With respect to a received sonic boom of 0.02 psf or less, for context, thunder overpressure resulting from lightning strikes at a distance of 0.6 mile is estimated to be 2 psf (FAA 2002).

The Proposed Action would not substantially diminish the protected activities, features, or attributes of any of the identified Section 4(f) properties, including NRHP-eligible properties (refer to Cultural Resources, Section 3.5.4) and thus would not result in substantial impairment of the properties. Therefore, the Proposed Action would not be considered a physical or constructive use of these properties and would not invoke Section 4(f) of the DOT Act. The Proposed Action would not result in significant impacts on Section 4(f) properties.

3.6.4.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South and northern DPG would not occur. Consequently, baseline conditions, as described in Section 3.6.3 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to Section 4(f) properties with implementation of the No-Action Alternative.

3.7 Biological Resources

3.7.1 Definition of Resource and Regulatory Setting

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to generally as wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal.

For the purposes of this EA, biological resources for the ROI is divided into three categories: vegetation types, wildlife, and special-status species.

- *Vegetation Types*: Vegetation types include dominant plant species.

- *Wildlife*: The wildlife section includes all common animal species: birds, mammals, reptiles, and amphibians.
- *Special-status Species*: For the purposes of this EA, special-status species include the following:
  - Species listed under the federal ESA, including associated critical habitat.
  - Golden eagle (*Aquila chrysaetos*) pursuant to the BGEPA.
  - Species listed pursuant to the MBTA.
  - Birds of Conservation Concern identified by the U.S. Fish and Wildlife Service (USFWS) as species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA (USFWS 2021). The region of influence for this EA falls within Bird Conservation Region 9, Great Basin.
  - Species listed as critically imperiled or imperiled by the State of Utah (Utah Wildlife Action Plan Joint Team 2015; Utah Division of Wildlife Resources [UDWR] 2022a).

The following regulatory requirements are addressed within the biological resources impact analysis: ESA; BGEPA; MBTA; EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*; and species listed as critically imperilled or imperilled by the State of Utah under Utah's Species of Greatest Conservation Need list (UDWR 2022).

3.7.2 Region of Influence (ROI)

The ROI includes the proposed Varda capsule landing area within UTTR South, northern DPG, and the surrounding area that may be impacted by the sonic boom (see Figure 3.4-1).

3.7.3 Existing Conditions

UTTR South and northern DPG occur within the geographic feature known as the Great Basin, specifically the Great Basin Desert. The Great Basin Desert is the largest desert in the U.S., covering roughly 158,000 square miles of southern Idaho, southeastern Oregon, western Utah, eastern California, and nearly all of Nevada. It is a high cold desert, with most of its elevations over 4,000 ft MSL, and most of its precipitation is in the form of snow, although rain showers and thunderstorms occur throughout the hotter months.

3.7.3.1 Vegetation Types

The majority of the proposed capsule landing area on UTTR South and virtually all of the landing area on DPG consists of unvegetated playa or dry lake bed (DPG 2016; Hill AFB 2020). This dry lake bed is the remains of Lake Bonneville that covered the UTTR/DPG area during the late Pleistocene epoch. Lake Bonneville was a fresh water lake that at its maximum extent covered an area of approximately 19,300 square miles and had a depth of more than 1,000 ft. The proposed UTTR South landing area also includes dune areas, primarily in the northeast and eastern portions of the landing area, and areas of shadscale (*Atriplex confertifolia*) and the non-native invasive cheatgrass (*Bromus tectorum*) occur within the center and eastern edge of the landing area (Hill AFB 2020).

3.7.3.2 Wildlife

Wildlife species within the Great Basin Desert region are those adapted to dry, high desert conditions dominated by sagebrush, saltbush, and greasewood. Due to the arid conditions, amphibian species diversity is low and only the Great Basin spadefoot toad (*Spea intermontana*) has been recorded on UTTR South. In contrast, the desert habitats within the UTTR/DPG region support a wide variety of reptile species including sagebrush lizard (*Sceloporus graciosus*), western fence lizard (*Sceloporus occidentalis*), desert horned lizard (*Phrynosoma platyrhinos*), western rattlesnake (*Crotalus viridis*), and Great Basin gopher snake (*Pituophis catenifer deserticola*). Numerous bird species occur within the ROI and common species include black-throated sparrow (*Amphispiza bilineata*), savannah sparrow (*Passerculus sandwichensis*), chukar (*Alectoris chukar*), cliff swallow (*Petrochelidon pyrrhonota*), red-tailed hawk (*Buteo jamaicensis*), golden

eagle (*Aquila chrysaetos*), common raven (*Corvus corax*), and horned lark (*Eremophila alpestris*). Common mammals observed within the ROI include desert woodrat (*Neotoma lepida*), deer mouse (*Peromyscus maniculatus*), white-tailed antelope ground squirrel (*Ammospermophilus leucurus*), black-tailed jackrabbit (*Lepus californicus*), American badger (*Taxidea taxus*), and coyote (*Canis latrans*) (DPG 2016; Hill AFB 2020).

3.7.3.3 Special-status Species

To determine the potential occurrence of ESA-listed species and critical habitat within the ROI, the USFWS's Information for Planning and Consultation (IPaC) website was accessed (USFWS 2022). Based on the ROI, three ESA-listed species potentially occur within the ROI: one bird, one fish, and one plant (Table 3.7-1); no critical habitat occurs within the ROI. No ESA-listed species occur within the proposed landing area on UTTR South or DPG lands (DPG 2016; Hill AFB 2020).

Table 3.7-1. ESA-listed Species Potentially Occurring within the ROI for Proposed Varda Capsule Reentry Operations

Common Name	Scientific Name	ESA Status
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*	Threatened
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened

Source: USFWS 2022.

As no ESA-listed species occur within the proposed capsule landing area, the only impact from proposed capsule RLR operations would be from the sonic boom during capsule reentry. The sonic boom would have no effect on the ESA-listed plant and fish species given the Ute ladies'-tresses are not susceptible to acoustic impacts and the sonic boom would not penetrate the water's surface in any location within the ROI that may support Lahontan cutthroat trout. Only the yellow-billed cuckoo may be impacted by the sonic boom. Therefore, the Lahontan cutthroat trout and Ute ladies'-tresses are not discussed further.

The only known occurrence of the yellow-billed cuckoo within the ROI is immediately south of the DPG within the Fish Springs NWR (see Figure 3.4-1) (UDWR 2022b). The yellow-billed cuckoo prefers thick riparian vegetative communities with a dense overstory of mature trees. The primary threat to the species is from habitat loss, particularly loss of riparian habitat from changes in watercourse hydrology and livestock overgrazing (USFWS 2014).

Although Utah's list of Species of Greatest Conservation Need includes 9 bird species, 6 mammal species, and 2 reptile species as either critically imperiled or imperiled within Utah (UDWR 2022a), none have been recorded within the proposed capsule landing area within UTTR South or northern DPG (DPG 2016; Hill AFB 2020). Of the 34 Birds of Conservation Concern listed for the Great Basin Bird Conservation Region (USFWS 2021), 11 have been recorded within the ROI: broad-tailed hummingbird (*Selasphorus platycercus*), Franklin's gull (*Leucophaeus pipixcan*), California gull (*Larus californicus*), black tern (*Chlidonias niger*), Forster's tern (*Sterna forsteri*), northern harrier (*Circus hudsonius*), long-eared owl (*Asio otus*), short-eared owl (*Asio flammeus*), olive-sided flycatcher (*Contopus cooperi*), sage thrasher (*Oreoscoptes montanus*), and Cassin's finch (*Haemorhous cassinii*) (DPG 2016; Hill AFB 2020). All of these species are also listed under the MBTA as well as dozens of other MBTA-listed species known to occur within the ROI.

3.7.4 Environmental Consequences

3.7.4.1 Proposed Action

Vegetation

Under the Proposed Action, the Varda capsule is expected to land within the proposed landing area on unvegetated playa or dry lake bed and there would be no impacts to vegetation. However, if the capsule

does not land within the playa, the next most common vegetation type within the proposed landing area is dominated by shadscale and the non-native invasive cheatgrass. As this is a very common vegetation community on UTTR South and northern DPG and the capsule would only impact approximately 7 ft^2 upon impact, there would be no significant impacts to vegetation. Although the main parachute would also potentially cover vegetation, this would be short term as the parachute would be recovered resulting in minimal to no impacts to vegetation. In addition, the landing area within UTTR South and northern DPG has been evaluated and used for similar operations, including previous NASA capsule recovery operations, and the Recovery Team would follow proven UTTR and DPG procedures and limit ground disturbances during recovery efforts, including potential impacts to vegetation from foot and vehicle traffic. Therefore, there would be no significant impacts to vegetation with implementation of the Proposed Action.

Wildlife

As stated above for vegetation, under the Proposed Action, the Varda capsule is expected to land within the proposed landing area on unvegetated playa or dry lake bed. This area is typically devoid of wildlife species except for bird species that may be potentially transiting through the area to other more vegetated surrounding habitats. Given the capsule would be descending at a relatively slow rate of speed under a very visible parachute, any wildlife species potentially under the capsule descent trajectory are expected to move away and not be struck by either the capsule or parachute.

Impacts to wildlife from the sonic boom associated with the Varda capsule reentry are not expected given the maximum sonic boom would be only 0.04 psf. Previous studies on the effects of sonic booms on wildlife have shown that wildlife are not significantly impacted at much higher sonic boom levels. Teer and Truett (1973) examined reproductive success in mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottus*), northern cardinal (*Cardinalis cardinalis*), and lark sparrow (*Chondestes grammacus*) when exposed to sonic booms >1 psf and found no adverse effects. Rylander *et al*. (1974) conducted experiments to observe the reaction of various bird species (ducks, gulls, and eiders) when exposed to sonic booms ranging from 1.2 psf to 13.4 psf. Reactions were small, with slight startle responses among all species. Awbrey and Bowles (1990) in a review of the literature on the effects of aircraft noise and sonic booms on raptors found that the available evidence shows very marginal effects on reproductive success. Ellis *et al*. (1991) examined the effects of sonic booms (actual and simulated) on eight nesting raptor species. While some individuals did respond by leaving the nest, the response was temporary and, overall, there were no adverse effects on nesting. Robinette and Rice (2019) found no differences in overall abundance or nest attendance of threatened western snowy plovers (*Charadrius nivosus nivosus*) or endangered California least tern (*Sterna antillarum browni*) before, during, and after the launch of a SpaceX Falcon 9 rocket and the associated sonic boom. Incubating snowy plovers were observed to startle and then either jump or hunker down in response to the sonic boom. The estimated received sonic boom overpressure level at the monitored western snowy plover nest area was 3.6 psf. Although incubating least terns at five nests left their nests prior to the sonic boom, all were back on their nests within less than a minute after the sonic boom. The estimated received sonic boom overpressure level at the monitored least tern nesting area was 2.6 psf (Robinette and Rice 2019).

Therefore, based upon the above discussion, there would be no significant impacts to wildlife with implementation of the Proposed Action.

Special-status Species

Impacts to special-status species (i.e., bird species listed under the MBTA and as USFWS Species of Conservation Concern) would be the same as those previously described for wildlife. Therefore, there would be no significant impacts to special-status species with implementation of the Proposed Action. No ESA-listed species occur within the proposed capsule landing area on UTTR South and northern DPG lands and therefore would not be subject to ground disturbing operations. The only ESA-listed species that may

occur within the ROI that may be impacted by the sonic boom during reentry is the yellow-billed cuckoo. Its only known occurrence within the ROI is immediately south of the DPG within the Fish Springs NWR (see Figure 3.4-1) (UDWR 2022b). Fish Springs NWR would receive a sonic boom at 0.01 psf twice per year. A sonic boom of 0.01 psf would be unlikely to even be detected on the ground as the sound level would be significantly less than that of a distant thunderstorm and would probably not be discernable from other ambient noise sources. Each year Tooele County experiences approximately 22 thunderstorms (National Oceanic and Atmospheric Administration 2022). With respect to a received sonic boom of 0.02 psf or less, for context, thunder overpressure resulting from lightning strikes at a distance of 0.6 mile is estimated to be 2 psf (FAA 2002). Therefore, proposed Varda reentry operations and associated sonic booms would not result in significant impacts to ESA-listed species. In addition, based upon the previous discussion of the effects of sonic booms on wildlife, particularly birds, a sonic boom of 0.1 psf would have no effect on the ESA-listed yellow-billed cuckoo and consultation under ESA section 7 would not be necessary.

3.7.4.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South and northern DPG would not occur. Consequently, baseline conditions, as described in Section 3.7.3 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to the regional noise environment with implementation of the No-Action Alternative.

3.8 AIRSPACE

3.8.1 Definition of Resource and Regulatory Setting

The FAA has overall responsibility for managing airspace through a system of flight rules and regulations, airspace management actions, and ATC procedures. The FAA accomplishes this through close coordination with state aviation and airport planners, military airspace managers, and other entities to determine how airspace can be used most effectively to serve all interests. All military and civilian aircraft are subject to Federal Aviation Regulations.

The FAA has designated four types of airspace above the U.S.: controlled, uncontrolled, special use, and other. The categories and types of airspace are dictated by the complexity or density of aircraft movements, the nature of the operations conducted within the airspace, the level of safety required, and national and public interest in the airspace.

3.8.1.1 Military Airspace

Controlled Airspace

Controlled airspace is a generic term that encompasses the different classifications of airspace (Class A, B, C, D, and E) and defines dimensions within which ATC service is provided for instrument flight rules (IFR) and visual flight rules (VFR) conditions. VFR air traffic flies below 18,000 ft MSL using visual references such as towns and highways as a means of navigation. VFR aircraft may also follow federal airways at altitudes not used by aircraft on instrument flight. VFR conditions rely heavily on "see and avoid" procedures that require pilots to be visually alert for and maintain safe distances from other aircraft, populated areas, obstacles, or clouds. Most other air traffic (including air passenger carriers, business aircraft, and military aircraft) operate under IFR conditions that require pilots to be trained and appropriately certified in instrument navigational procedures. The respective procedures established under VFR and IFR for airspace use and flight operations help segregate aircraft operating under each set of rules.

Uncontrolled Airspace

Uncontrolled airspace, or Class G, is not subject to the restrictions that apply to controlled airspace. Limits of uncontrolled airspace typically extend from the ground surface to 700 ft AGL but can extend above these altitudes to as high as 14,500 ft MSL if the FAA has designated no other types of controlled airspace. ATC

does not have the authority to exercise control over aircraft operations within uncontrolled airspace. Primary users of uncontrolled airspace are general aviation aircraft operating in accordance with VFR.

Special Use Airspace (SUA)

SUA consists of airspace within which specific activities must be confined, or where limitations are imposed on aircraft not participating in those activities, or both. With the exception of Controlled Firing Areas, SUA is depicted on sectional aeronautical charts. These charts include hours of operation, altitudes, and the agency controlling the airspace. All SUA descriptions are contained in FAA Order JO 7400.10D (*Special Use Airspace*) and published in the DoD Flight Information Publication AP/1A: Special Use Airspace North and South America and AP/1B: Area Planning Military Training Routes North and South America. There are two types of SUA: Regulatory and Non-regulatory. Regulatory SUA includes Restricted Areas (RAs) and Prohibited Areas. Non-regulatory SUA includes Military Operations Areas (MOAs), Aerial Refueling Tracks, Alert Areas, Warning Areas, and National Security Areas. For the purposes of this EA, only RAs and MOAs are addressed as the Proposed Action would not affect any other regulatory or non-regulatory SUA.

- *RAs*. RAs contain airspace identified by an area on the surface of the earth within which flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within RAs must be confined because of their nature or limitations imposed upon nonparticipating aircraft operations that are not a part of those activities or both. RAs denote the existence of unusual, often invisible, hazards to aircraft such as live firing of weapons, ordnance delivery, and/or aircraft testing. Flight operations within RAs without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. RAs are published in the Federal Register and constitute 14 CFR Part 73.
- *MOAs*. MOAs are non-regulatory SUA with defined vertical and lateral limits for the purpose of separating certain military training activities from IFR traffic. Whenever a MOA is being used, nonparticipating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. Otherwise, ATC will reroute or restrict nonparticipating IFR traffic. When a MOA is active (when military activity is being conducted), all IFR traffic is re-routed around the area. Non-participating VFR traffic may enter the active MOA but should exercise extreme caution and see and avoid procedures must be used.

Other

Includes Military Training Routes (MTRs), Low-Altitude Training and Navigation (LATN) areas, landing zones, and Air Traffic Controlled Assigned Airspace (ATCAA). None of these airspace types would be affected by the Proposed Action and are not discussed further.

3.8.1.2 Civil Airspace

Civil aviation operations consist primarily of commercial and general aviation and can occur anywhere within the ROI if, and when, permitted. Civilian pilots often operate by VFR using topographic or highway features and/or using Global Positioning System (GPS) for direct routing. Specified routes and areas facilitate air transportation and airspace management.

Victor Airways, sometimes referred to as Victor Routes, are “highways in the sky” used by pilots to transit between radio navigational aids. Victor Airways are designated on aeronautical charts with the letter “V” (Victor) followed by the airway number (e.g., V200). Victor Airways are Class E airspace extending typically from 1,200 ft AGL up to but not including 18,000 ft MSL. Low-altitude Victor Routes do not penetrate restricted airspace and generally do not penetrate MOAs. Those that do pass through a MOA cannot carry IFR traffic when the MOA is active.

Jet Routes are 8-nautical mile wide corridors designated to serve aircraft operations in the high-altitude airspace structure from 18,000 ft MSL up to and including 45,000 ft MSL and in the low-altitude airspace structure below 18,000 ft MSL. The radio navigational aids used for Victor Routes also define Jet Route centerlines. Jet Routes are depicted on aeronautical charts and are identified by a "J" (Jet) followed by the airway number (e.g., J12). The Jet Route system is designed to facilitate efficient cross-country travel and provide linkages to major air terminals. The floors of these routes vary from segment to segment depending on the altitudes necessary to provide clear reception of the navigational signals and safe overflight clearance above the underlying terrain.

Published Area Navigation (RNAV) routes, including Q-Routes and T-Routes, can be flight planned for use by aircraft with RNAV capability, subject to any limitations or requirements noted on en route charts, in applicable Advisory Circulars, or by NOTAM. RNAV routes are depicted on aeronautical charts and are identified by the letter "Q" or "T" followed by the airway number (e.g., Q13, T205). High-altitude Q-routes are available for use by RNAV-equipped aircraft between 18,000 ft MSL and 45,000 ft MSL inclusive. Low-altitude T-routes from 1,200 ft AGL (or in some instances higher) up to but not including 18,000 ft MSL are available for use by GPS-equipped aircraft conducting IFR operations to efficiently fly around or through Class B and Class C airspace areas.

3.8.2 Region of Influence (ROI)

The ROI includes SUA used for military aircrew training (e.g., RAs, MOAs) as well as civil airspace use within and in the vicinity of the proposed Varda reentry trajectory and landing area.

3.8.3 Existing Conditions

3.8.3.1 Military Airspace Use

The UTTR consists of UTTR North Range and UTTR South Range. Each range includes RAs and MOAs, and the South Range offers supersonic operating areas for training operations. The SUA associated with the UTTR are listed in Table 3.8-1 and depicted in Figure 3.8-1. Salt Lake City Air Route Traffic Control Center (ARTCC) controls airspace in the ROI. An ARTCC is a facility established to provide ATC service to aircraft operating on IFR flight plans within controlled airspace, principally during the en-route phase of flight.

Table 3.8-1. Existing SUA Overlying or Adjacent to UTTR North and South

Airspace Unit	Floor (ft MSL unless otherwise noted)	Ceiling (ft MSL unless otherwise noted)	Time of Use	Controlling Agency
UTTR NORTH RANGE				
Lucin B MOA	100 AGL	7,500	7:00 am to 12:00 am Mon-Fri. 8:00 am to 5:00 pm Sat.	Salt Lake City ARTCC
Lucin E MOA	7,501	18,000	7:00 am to 12:00 am Mon-Thu; 8:00 am to 5:00 pm Fri.	Salt Lake City ARTCC
R-6404A	Surface	58,000	Continuous	Salt Lake City ARTCC
R-6404B	Surface	13,000	Continuous	Salt Lake City ARTCC
R-6404C	100 AGL	28,000	Continuous	Salt Lake City ARTCC
R-6404D	13,000	25,000	By NOTAM	Salt Lake City ARTCC
UTTR SOUTH RANGE				
R-6402A	Surface	58,000	Continuous	Salt Lake City ARTCC
R-6402B	100 AGL	58,000	Continuous	Salt Lake City ARTCC
R-6405	100 AGL	58,000	Continuous	Salt Lake City ARTCC
R-6406A	Surface	58,000	Continuous	Salt Lake City ARTCC
R-6406B	100 AGL	58,000	Continuous	Salt Lake City ARTCC
R-6407	Surface	58,000	Continuous	Salt Lake City ARTCC

3.8.3.2 Civil Airspace Use

There 3 Victor Routes (V6, V288, V484) and 4 Jet Routes (J12, J15, J94, J158) are to the north of UTTR North and are below the proposed Varda reentry trajectory (Figure 3.8-1).

No Victor Routes transit UTTR South. Victor Route V32/V200, Jet Route J154, and Q-Route Q124 are located between UTTR South and UTTR North and provide a corridor for low-altitude civilian flights across this portion of Utah (Figure 3.8-1). One high-level Jet Route (J56) crosses the UTTR South/DPG RAs (R-6407, R-6406A, and R-6406B).

3.8.4 Environmental Consequences

3.8.4.1 Proposed Action

The proposed landing area would be within UTTR South and northern DPG which are under the restricted airspace of R-6406A, R-6407, and R-6402A that extend from the surface to 58,000 ft MSL (FAA 2022) (Figure 3.8-1). UTTR ATC would coordinate and manage airspace surveillance and clearance to enable descent and landing of the reentry capsule from space to ground. All reentry operations would comply with the necessary notification requirements, including establishing and issuing flight restrictions and NOTAMs and coordinating with FAA ATO. A NOTAM provides notice of unanticipated or temporary changes to components of, or hazards in, the National Airspace System (FAA Order 7930.2S [CHG 2], *Notices to Air Missions [NOTAM]*). The FAA issues a NOTAM at least 48 hours prior to a reentry activity in the airspace to notify pilots and other interested parties of temporary conditions. Advance notice via NOTAMs would assist pilots in scheduling around any temporary disruption of flight in the area of operation.

As stated previously in Chapter 2, to comply with the FAA's licensing requirements, Varda would enter into an LOA with FAA ATO Space Operations, and any other ATO ATC facilities affected, and Headquarters UTTR to accommodate the flight parameters of Varda reentry operations. The LOA outlines and defines procedures for notification and real-time communication prior to, during, and after an operation; procedures for issuance of a NOTAM; and any additional measures deemed necessary to protect public health and safety. The Proposed Action would not require the FAA to alter the dimensions (shape and altitude) of the airspace. However, temporary closures of existing airspace may be necessary to ensure public safety during the proposed operations.

The FAA conducts an analysis of the constraints on airspace efficiency and capacity for each licensed reentry operation. This analysis is documented in an Airspace Management Plan, which is completed approximately 3-5 days prior to reentry. This information helps the FAA determine whether the proposed reentry would result in an unacceptable limitation on air traffic. If that were the case, the FAA may need to work with the operator to identify appropriate mitigation strategies, such as shortening the requested reentry window or shifting the reentry time, if possible. The FAA often provides data to reentry operators to avoid operations during days with high aviation traffic volume.

Prior to each reentry operation, the airspace that must be temporarily closed would be defined and published through a NOTAM. Specific reentry trajectories (including latitude and longitude coordinates) for Varda operations would be based on mission-specific needs. The specific reentry trajectory and associated AHA would be provided in Varda's Flight Safety Data Package that would be submitted to the FAA in advance of the reentry and used to determine the necessary airspace closures provided in the NOTAM.

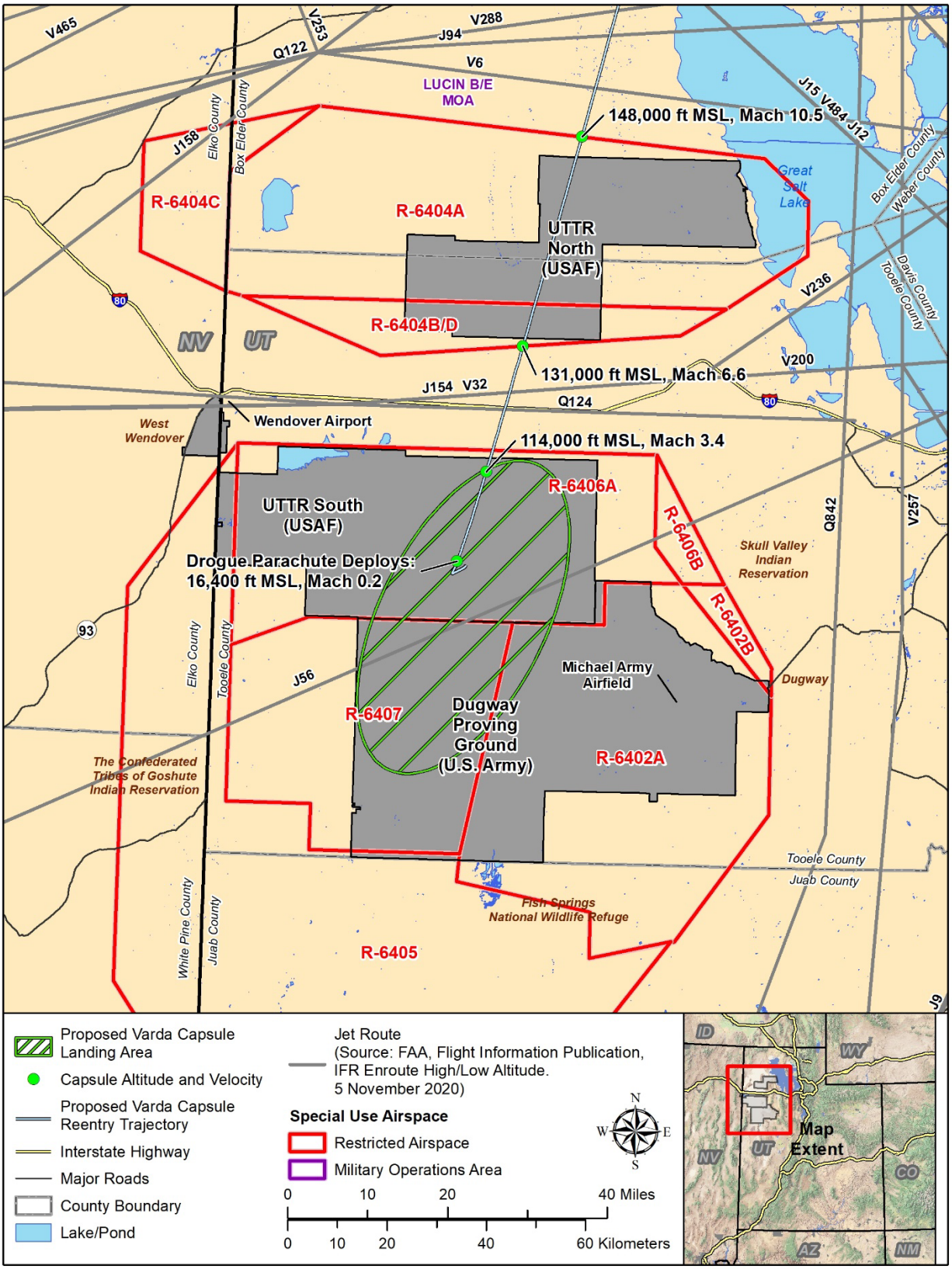


Figure 3.8-1. SUA and Civil Air Routes within the Vicinity of the Proposed Varda Capsule Reentry Trajectory and Landing Area

All reentry operations would continue to comply with the necessary notification requirements, including issuance of NOTAMs, consistent with current procedures. Reentry operations would be of short duration and scheduled in advance to minimize interruption to airspace. En-route flights would utilize established alternative routes to minimize interruption to air traffic. Safety and security factors dictate that use of airspace and control of air traffic be closely regulated. Accordingly, regulations applicable to all aircraft are promulgated by the FAA to define permissible uses of designated airspace. These regulations are intended to accommodate the various categories of aviation, whether military, commercial, or private aviation enthusiasts.

Airspace controlled by the FAA may be restricted specifically through activation of a stationary altitude reservation (ALTRV). An ALTRV encompasses activities in a fixed volume of airspace to be occupied for a specified time period. Stationary ALTRVs may include activities such as special tests of weapons systems or equipment; certain U.S. Navy operations; rocket, missile, and drone operations; and commercial space operations. The NOTAM would establish a closure window that is intended to warn aircraft to keep out of a specific region throughout the time that a hazard may exist. The length of the window is primarily intended to account for the time needed for the operator to meet its mission objectives. The location and size of the closure area is defined to protect the public. For a reentry, typically the closure must begin at the time of the beginning of reentry and must end when the reentry vehicle has reached the bottom of the affected airspace.

ALTRVs are immediately released once the mission has successfully cleared the area and all planned reentry items (e.g., Varda capsule and associated drogue and main parachutes) no longer impose a risk to the public. The actual duration of airspace closure is normally much less than the original planned closure, especially if the reentry window is relatively long and the reentry occurs at the beginning of the window. The FAA typically begins to clear airspace and reroute aircraft in advance of a reentry and directs aircraft back into the released airspace after the reentry vehicle has landed to recover to normal flow and volume.

The airspace closure duration depends on the mission type. For the proposed Varda capsule, the reentry window is anticipated to be less than 4 hours. This closure time represents the maximum value for this type of mission. The FAA and Varda would take steps to reduce the airspace closure durations as a mission unfolds. Generally, while it may request a window that spans hours in order to have more opportunity to work around weather or technical issues, the operator makes every effort to conduct its reentry operations as soon as it is ready in the reentry window. Further, as the reentry operation unfolds successfully, the FAA incrementally releases airspace as it is no longer affected. The release of airspace closures will vary, as it will be released based on reentry trajectory calculations, which can change mission to mission. In practice, the FAA attempts to divide airspace closures into subsets that can be released incrementally in time, as well as geographically based on airspace boundaries. In doing so, the actual closure times are often significantly shorter than projected maximum values defined in a given NOTAM.

The location and size of airspace closures for commercial space operations also are influenced by multiple factors, including hardware reliability and the type of reentry vehicle. The size of airspace closures in the along the reentry trajectory and in the vicinity of the capsule landing area shrink as reliability is established with results and analysis from each reentry operation. For the initial reentry of a new vehicle, the hazard areas and associated airspace closures around the reentry trajectory and capsule landing area are bigger to account for the increased likelihood of a vehicle failure, relative to a mature and tested capsule. Subsequent reentries of that vehicle will likely include even smaller hazard areas compared to the initial reentry.

Three Victor Routes and four Jet Routes, and one Q Route underlie the proposed Varda reentry trajectory (Figure 3.8-1). Except for J56, the highest ceiling of all of these routes (45,000 ft MSL) would be significantly below the altitude of the Varda capsule along the proposed northeast-to-southwest reentry trajectory (i.e., between 114,000 and 150,000 ft MSL) as it crosses these routes. Although J56 passes over

the southeastern corner of UTTR South and the northwestern corner of DPG, it is unavailable when R-6405, R-6406A and B, and R-6407 are in use, which would be the case during proposed Varda capsule reentry operations.

Under the Proposed Action, Varda capsule reentry and landing operations would be infrequent (1-2 per year, or a maximum of 4 operations during 2023-2025), of short duration, scheduled in advance to minimize interruption to air traffic, and announced via the publication of NOTAMs for the affected airspace. Therefore, implementation of the Proposed Action would not result in significant impacts to airspace management or any users of the affected airspace.

3.8.4.2 No-Action Alternative

Under the No-Action Alternative, the proposed Varda small capsule RLR operations at UTTR South and northern DPG would not occur. Consequently, baseline conditions, as described in Section 3.8.3 (*Existing Conditions*), would remain unchanged. Therefore, there would be no significant impacts to airspace management and operations with implementation of the No-Action Alternative.

Chapter 4.
Cumulative Impacts

Cumulative impacts or effects are defined by CEQ as the "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR §1508.1(g)(3) (2022). The FAA and DAF have analyzed the potential cumulative impacts in accordance with CEQ regulations, FAA Order 1050.1F, and 32 CFR 989.

For this EA, spatial and temporal boundaries were delineated to determine the area and projects the cumulative analysis would address. For this cumulative impacts analysis, the spatial boundary is the proposed Varda capsule landing area at UTTR South and northern DPG and the associated surrounding area subject to the sonic boom during the proposed capsule reentry. The temporal boundary includes past actions that have occurred within the last 3 years, and reasonably foreseeable future actions include those that are planned to occur within the next 5 years.

The projects identified in the following sections include those that had or have the potential to affect the environmental impact categories that are analyzed in this EA.

4.1 Past Actions

Past projects and actions at UTTR South are primarily tied to aircraft operations and other activities on the range. No past actions within the northern portion of DPG have been identified that would result in potential cumulative effects when combined with the Proposed Action. No projects within the last 3 years within UTTR South and DPG have been identified that would result in potential cumulative effects when combined with the Proposed Action.

4.2 Present Actions

Present projects and actions at UTTR South are primarily tied to on-going military activities, particularly aircraft operations and other activities on the range. No current actions at UTTR South were identified that may result in potential cumulative effects when combined with the Proposed Action. No current actions within the northern portion of DPG have been identified that would result in potential cumulative effects when combined with the Proposed Action.

4.3 Reasonably Foreseeable Future Actions

UTTR South/northern DPG is the landing site for NASA's OSIRIS-Rex mission that will return a capsule with material from an asteroid and is proposed to land at UTTR South in September 2023 (NASA 2013). Other reasonably foreseeable future projects and actions at UTTR South are primarily tied to aircraft operations and other activities on the range. No future actions within the northern portion of DPG have been identified that would result in potential cumulative effects when combined with the Proposed Action. No future actions or projects were identified that would result in potential cumulative effects when combined with the Proposed Action.

4.4 Environmental Consequences

This EA uses information presented in Sections 4.1, 4.2, and 4.3 to determine potential cumulative impacts. The Proposed Action's impacts were analyzed for their potential to result in cumulative impacts when added to past, present, and reasonably foreseeable future actions.

As discussed in Section 3.1, implementation of the Proposed Action would result in no impact to the following impact categories: water resources; hazardous materials, solid waste, and pollution prevention; coastal resources; Department of Transportation Act, Section 4(f); farmlands; land use; natural resources and energy supply/utilities; and socioeconomics, environmental justice, and children's environmental

health and safety risks; visual effects; geology and soils; transportation; and public health and safety. Therefore, when combined with past, present, and reasonably foreseeable projects, the Proposed Action would not result in cumulative impacts to these impact categories.

Implementation of the Proposed Action would result in less than significant impacts to air quality; climate; noise and noise-compatible land use; biological resources; historical, architectural, archeological, and cultural resources; and airspace. The Proposed Action would result in four RLR operations during the period of 2023 through 2025. Proposed capsule recovery operations would result in a negligible increase in air emissions, including GHGs, from helicopter and surface vehicle use. A very low level sonic boom would occur during each of the proposed four capsule reentry operations. However, the sonic boom would be significantly below the noise level of current and future supersonic operations over UTTR South and northern DPG that result in 22 sonic booms per month. This negligible increase in air emissions and noise would result in associated negligible cumulative impacts to air quality, including climate and GHGs, noise within UTTR South, and biological resources when combined with current military operations at UTTR South and northern DPG. As no past or reasonably foreseeable projects and actions have been identified within or in the vicinity of the proposed Varda capsule landing area, implementation of the Proposed Action would not result in significant cumulative impacts to any resource area assessed in this EA.

Chapter 5.
List of Preparers and Agencies and Persons Consulted

5.1 List of Preparers

Federal Aviation Administration

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Years of Experience: 22

5.2 List of Agencies and Persons Consulted

To be provided in the Final EA upon completion of coordination and consultation.

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Chapter 6.
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Appendix A:
Public/Agency Correspondence

To Be Provided upon receipt of comments after review of the public Draft EA.

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Appendix B:
Air Quality Methodology and Calculations

B.1 AIR EMISSIONS

B.1.1 Emissions from Vehicle Activities

Vehicle activities associated with the Proposed Action include those related to personnel commuting to the site as well as vehicle operations during the training and testing exercises. Emission factors from U.S. Environmental Protection Agency's (USEPA's) *Compilation of Air Pollutant Emissions Factors* (AP-42) (USEPA 1995), in pounds per horsepower-hour (lbs/hp-hr) of on-road and off-road mobile sources emissions inventories, were used to estimate the combustion emissions from vehicles activities.

Table B-1 summarizes the assumptions used. Tables B-2 and B-3 present the combustion emission factors and the estimated emissions, respectively.

Table B-1. Assumptions used for Estimating Combustion Emissions from Vehicle Operations

Activity	Emission Sources	Assumptions
Van transport of capsule	Combustion emissions from vehicles	Transfer of capsule from Wendover, Utah to Torrance, California using highways. Assumes 10 hours of travel for each recovery effort.

Table B-2. Combustion Emission Factors

Activity	Vehicle	Emissions Factors (lbs/hp-hr)						
		VOC	CO	NOx	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Transport of capsule to Torrance, CA	Standard Cargo Van	0.021	0.007	0.011	0.0006	0.0007	0.0007	1.08

Table B-3. Estimated Total Combustion Emissions from Vehicle Activities

Activity	Vehicles	Total Emissions (tons)						
		VOC	CO	NOx	SO_x	PM_{10}	$PM_{2.5}$	CO_2
Van transport of capsule	Standard Cargo Van	0.13	0.04	0.07	0.004	0.004	0.004	5.88

Notes: CO = carbon monoxide; CO_2 = carbon dioxide; NO_x = nitrogen oxides; SO_x = sulfur oxides; $PM_{2.5}$ = particulate matter ≤2.5 microns in diameter; PM_{10} = particulate matter ≤10 microns in diameter, VOC = volatile organic compound.

B.1.3 Emissions from Aircraft Activities

Aircraft operations of concern are those that occur from ground level up to 3,000 feet (ft) above ground level (AGL). The 3,000 ft AGL altitude was assumed to be the ceiling of the mixing zone (known as the atmospheric mixing height) above which any pollutant generated would not contribute to increased pollutant concentrations at ground level. Pollutants emitted by aircraft above 3,000 ft AGL are excluded from the analysis of compliance with National Ambient Air Quality Standards. The pollutant emission rate is a function of the aircraft engine's fuel flow rate and efficiency. Emissions for one complete training activity for a particular aircraft are calculated by knowing the specific engine pollutant emission factors for each mode of operation. For this analysis, emission factors for the platform (Bell 206) were obtained from the Air Force Civil Engineer Center's *Air Emissions Guide for Air Force Mobile Sources* (U.S. Air Force 2013). Pollutant emissions were calculated by applying the emission factor, in pounds per hour or pound per operation, by the applicable operational parameter in hours or number of operations. It was assumed that there would be eight landing/takeoff (LTO) cycles per operation with each helicopter traveling between landing sites above the mixing level of 3,000 ft AGL. As such, only LTOs were included in the calculation of air emissions.

In addition, the assessment of fugitive dust emissions during helicopter landing and takeoff operations within the recovery area was conducted based upon Gillies *et al*. (2007) where measurements were made of a UH-1H Huey on dry, unpaved desert in Arizona. Based on those measurements, 1.1 lbs of PM_{10} were generated during takeoff and 2 lbs during landing. The emission factor for $PM_{2.5}$ for unpaved roads is 0.1 x PM_{10} emissions (Western Governors' Association 2006). Therefore, total emissions for each LTO are 3.1 lbs of PM_{10} and 0.3 lb of $PM_{2.5}$. The fugitive dust emissions from the light duty Bell 106 helicopter are expected to be less than a UH-1H Huey, so these emissions estimates are considered overly conservative.

Tables B-4 and B-5 present the emission factors, and Table B-6 presents the estimated aircraft emissions.

Table B-4. Aircraft Emission Factors

Aircraft	Engine	Power Setting	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1,000 lbs fuel)						
				VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2e
Bell 206	T63-A-5a	Ground Idle	61	23.35	79.15	1.42	1.07	0.83	0.75	3,214.59
		Flight Idle	70	12.02	61.83	1.89	1.07	0.83	0.75	3,214.59
		30%	105	3.76	38.59	2.9	1.07	0.97	0.87	3,214.59
		60%	157	0.78	20.79	4.11	1.07	0.51	0.46	3,214.59
		Military	215	0.09	7.54	5.07	1.07	0.5	0.45	3,214.59

Table B-5. Aircraft Emission Factors by Flight Mode

Mode	Time In Mode (hr)	Power Setting	Emissions Per Flight Mode (lbs)						
			VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2e
Taxi Out	0.17	Ground Idle	0.237	0.805	0.014	0.011	0.008	0.008	32.682
Takeoff	0.02	Military	0.043	0.222	0.007	0.004	0.003	0.003	11.519
Climb out	0.07	60%	0.026	0.27	0.02	0.007	0.007	0.006	22.502
Approach	0.13	60%	0.016	0.435	0.086	0.022	0.011	0.01	67.292
Taxi In	0.08	Ground Idle	0.0005	0.038	0.026	0.005	0.003	0.002	16.341
Takeoff							1.1	0.1	
Landing							2.0	0.2	
		LTO Cycle	**0.324**	**1.77**	**0.153**	**0.05**	**3.131**	**0.328**	**150.336**

Table B-6. Estimated Total Aircraft Emissions for the Proposed Action (2023-2025)

# LTO Cycles	Emissions (tons)						
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	CO_2e
16	0.005	0.03	0.002	0.0008	0.05	0.003	2.4

B.2 RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT (CAA) CONFORMITY

The Proposed Action falls under the RONA category and is documented herein.

B.2.1 Introduction

The USEPA published Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule, in the November 30, 1993, Federal Register (40 CFR Parts 6, 51, and 93). On April 5, 2010, the USEPA finalized revisions to the General Conformity Rule (75 Federal Register 17253–17279). These publications provide implementing guidance to document CAA Conformity Determination requirements. This RONA is provided to document compliance of the Proposed Action.

Federal regulations state that "no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity that does not conform to an applicable State Implementation Plan." It is the responsibility of the federal agency to determine whether a federal action conforms to the applicable State Implementation Plan before the action is taken (40 CFR section 51.850[a]).

Federal actions may be exempt from conformity determinations if their emissions do not exceed designated *de minimis* levels for the criteria pollutants of nonattainment or maintenance in the areas of the federal action (40 CFR section 51.853[b]).

B.2.2 Proposed Action

Action Proponent: U.S. Air Force

Location: The proposed project area is located entirely within Tooele County, Utah. Portions of Tooele County are in serious nonattainment for $PM_{2.5}$ (2006 standard), marginal nonattainment for ozone (2015 8-hour standard), and nonattainment for SO_2 (1971 standard); the County is classified as unclassified/attainment for all other criteria pollutants (USEPA 2022).

Proposed Action Name: Varda Capsule Reentry, Landing, & Recovery Operations within the Utah Test and Training Range (UTTR) South and Dugway Proving Ground (DPG).

Proposed Action and Emissions Summary: The Proposed Action involves activities that produce emissions of ozone precursors. As a result, Proposed Action emissions were evaluated to assess compliance with the applicable General Conformity Rule *de minimis* thresholds (Table B-7).

Table B-7. Criteria Pollutants *de minimis* Levels

Pollutant	Area Type	Tons/year
Ozone (VOC or NO_x)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
CO, SO_2 and NO_2	All nonattainment & maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$*	All nonattainment & maintenance	100
Lead	All nonattainment & maintenance	25

Notes: NO_X = nitrogen oxides, VOC = volatile organic compound. *=There are four main $PM_{2.5}$ precursor pollutants (SO_2, NO_x, VOCs, and ammonia [NH_3]).
Source: 40 CFR 93.153(b)(1-2)

Table B-8 presents the estimated emission increase associated with the Proposed Action and compares the emissions to the General Conformity Rule *de minimis* thresholds.

Table B-8. Estimated Total Emissions for the Proposed Action

Emissions	Total Emissions (tons)					
	VOCs	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Vehicle – Combustion	0.130	0.04	0.070	0.0040	0.0040	0.0040
Aircraft	0.005	0.03	0.002	0.0008	0.0005	0.0005
Aircraft – Dust					0.0500	0.0030
Total	**0.135**	**0.07**	**0.072**	**0.0048**	**0.0545**	**0.0075**
General Conformity Nonattainment/ Maintenance de minimis Levels	50	100	100	100	100	100
Exceeds *de minimis* Level?	**No**	**No**	**No**	**No**	**No**	**No**

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, VOCs = volatile organic compounds, PM_{10} = particulate matter ≤10 microns in diameter, $PM_{2.5}$ = particulate matter ≤2.5 microns in diameter, SO_x = oxides of sulfur.

A.2.3 Proposed Action Exemptions

The Proposed Action is exempt from the General Conformity Rule requirements based on the determination that the emissions are well below the *de minimis* threshold for all applicable pollutants.

A.2.4 Emissions Evaluation Conclusion

De minimis thresholds for affected pollutants would not be exceeded as a result of implementation of the Proposed Action. The emissions data supporting that conclusion are shown in Table B-8 above. The calculations, methodology, data, and references are contained in Section 3.2 (*Air Quality*) of the Environmental Assessment and in this appendix. Therefore, further formal Conformity Determination procedures are not required, resulting in this RONA.

RONA Approval

Signature:_____

Name:____Lawrence Wolski_____ Date:_____6 August 2022_____

Position:____Sr. Noise and Air Quality Analyst_____

B.3 REFERENCES

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Appendix C:
Programmatic Agreement among the United States Air Force 75th Air Base Wing, the Utah State Historic Preservation Office, and the Advisory Council on Historic Preservation Regarding Operations, Maintenance, and Development Activities at Hill Air Force Base, Utah Test and Training Range, and Little Mountain Test Facility, Utah

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PROGRAMMATIC AGREEMENT AMONG
THE UNITED STATES AIR FORCE 75TH AIR BASE WING,
THE UTAH STATE HISTORIC PRESERVATION OFFICE,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING OPERATIONS, MAINTENANCE, AND DEVELOPMENT ACTIVITIES AT HILL AIR FORCE BASE, UTAH TEST AND TRAINING RANGE, AND LITTLE MOUNTAIN TEST FACILITY, UTAH

WHEREAS, the United States Air Force 75 Air Base Wing (75 ABW), or future command, proposes to continue to coordinate and administer an ongoing program of operation, maintenance and development (Program); and

WHEREAS, the 75 ABW has authority over federally owned lands on Hill Air Force Base (HAFB), the Utah Test and Training Range (UTTR), and Little Mountain Test Facility (Little Mountain) to carry out the Program pursuant to Air Force Regulation, thereby making the Program an undertaking subject to review under Section 106 of the National Historic Preservation Act (NHPA) 54 U.S.C. § 306108, and its implementing regulations, 36 Code of Federal Regulations (CFR) Part 800; and

WHEREAS, the 75 ABW has defined the Area of Potential Effects (APE) to include federally owned lands in Utah administered by the 75 ABW including HAFB (6,611 acres), the UTTR (943,374 acres), and Little Mountain (692 acres) as described in Appendix D; and

WHEREAS, the 75 ABW, the Utah State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP) have determined pursuant to 36 CFR Part 800 that undertakings under this Program have the potential to affect the Ogden Air Material Area Historic District, the Hill Field Historic Housing District, the Strategic Air Command Alert Historic District, the proposed Little Mountain Historic District, the proposed UTTR Oasis Historic District, and properties eligible for or listed in the National Register of Historic Places (NRHP), and that certain exclusions and streamlining measures outlined in this Programmatic Agreement (PA) are warranted to accommodate both military and preservation goals; and

WHEREAS, the 75 ABW has consulted with the Blackfeet Tribe, Confederated Tribes of the Goshute Indian Reservation, Crow Nation, Duckwater Shoshone Tribe of the Duckwater Reservation, Eastern Shoshone Tribe, Ely Shoshone Tribe, Hopi Indian Tribe, Navajo Nation, Northern Arapaho Tribe, Northwestern Band of Shoshone Nation, Paiute Indian Tribe of Utah, Pueblo of Zuni, San Juan Southern Paiute Tribe, Shoshone-Bannock Tribes of the Fort Hall Business Council, Shoshone-Paiute Tribes of the Duck Valley Reservation, Skull Valley Band of Goshute Indians, Te-Moak Tribe of Western Shoshone, Ute Indian Tribe, Ute Mountain Ute Tribe, Wells Band of Western Shoshone, and the Confederate Salish & Kootenai Tribes of the Flathead Nation, all federally recognized Indian tribes (Tribes) and has invited these Tribes to consult, recognizing the potential concerns for properties of traditional religious and cultural importance; and

WHEREAS, the 75 ABW acknowledges that this PA will not affect consultation with the Tribes; and

WHEREAS, pursuant to Air Force Manual 32-7003 § 1.14.2., *Environmental Conservation*, the Department of the Air Force has designated the Installation Commander (75 ABW/CC) to serve as the agency official with approving authority for the implementation of the PA as a requirement of Section 106 of the NHPA; and

WHEREAS, the 75 ABW's Civil Engineer Group (75 CEG) manages the built and natural infrastructure for the day-to-day operations and long-range planning, design, construction, environmental protection, and real property functions, with the Commander designating the 75 CEG Base Civil Engineer (BCE) to be a key point of contact regarding Section 106; and

WHEREAS, the BCE finds that many of the maintenance and repair activities are of a scale, scope, and routine nature that case-by-case review under the Section 106 process (36 CFR §§ 800.3 through 800.7) often results in no historic properties affected, or findings of no adverse effect, in a manner of predictive redundancy; and

WHEREAS, the BCE finds that a programmatic approach, employing the present PA, is an appropriate and improved way (in accordance with 36 CFR § 800.14(b)(2)) for the BCE to address the circumstances of such routine and redundant maintenance and repair activities, and will produce equivalent appropriate consideration of historic properties at HAFB, the UTTR, and Little Mountain when such activities are planned, including recognition that there will remain potential for historic properties to be affected by such undertakings, and this approach will allow the BCE and consulting parties to give attention to a number of other important Section 106-related undertakings within HAFB, the UTTR, and Little Mountain; and

WHEREAS, the management of certain buildings and landscape features located within the Hill Field Historic Housing District, are governed by the 2002 *Memorandum of Agreement Between the United States Air Force and the Utah State Historic Preservation Officer, Regarding the Privatization of Family Housing Hill Air Force Base, Utah*, and those specific buildings and landscape features are therefore not part of this PA; and

WHEREAS, districts, sites, buildings, structures, and objects that are 50 years of age or older that have not yet been evaluated for eligibility to the NRHP will be considered eligible to the National Register of Historic Places (NRHP) for this PA; and

WHEREAS, areas identified as containing unexploded ordinance and have been listed as impact and/or No-Go areas (described in Appendix C) will not be surveyed for archaeological sites because of human health and safety issues; and

NOW, THEREFORE, the 75 ABW/CC, the SHPO, and the ACHP agree that the Program activities shall be implemented in accordance with the following stipulations in order to take into account potential effects of the undertaking on historic properties.

STIPULATIONS

The 75 ABW/CC shall ensure that the following stipulations are carried out.

I. RESPONSIBILITIES

A. The 75 ABW/CC is responsible for ensuring that historic properties on federally owned lands administered by the 75 ABW, and properties not federally owned but potentially affected by 75 ABW undertakings, are managed and maintained in accordance with NHPA requirements. The 75 ABW/CC shall designate the 75 CEG Cultural Resource Manager (CRM) with the authority to implement the stipulations identified in this PA. All actions performed by the 75 ABW, or on behalf of the 75 ABW, in compliance with the terms of this PA shall be conducted by, or under the supervision of, a qualified professional meeting the Secretary of Interior's (SOI) Professional Qualifications Standards in Archaeology, History, Architectural History, or Historic Architecture, as applicable.

B. The 75 ABW/CC shall ensure that all individuals designated to perform cultural resource management duties are qualified under the SOI Professional Qualifications Standards for the tasks appointed to them.

II. SECTION 106 REVIEW PROCESS

A. Determine the Undertaking,

1. The CRM shall determine if the proposed project is an undertaking as defined in 36 CFR § 800.16(y).

a) If the CRM determines the proposed project is not an undertaking as defined in 36 CFR § 800.16(i), the CRM the 75 ABW has no further obligations under this Stipulation.

b) If the CRM determines that the proposed project is listed in Appendix A, Excluded Actions, the CRM shall document this determination for inclusion in the Annual Report, and the 75 ABW has no further obligations under this Stipulation.

c) If the CRM determines the proposed project is an undertaking not listed in Appendix A, the CRM will continue on in the Section 106 Project Review Process as defined in this document.

B. Define the APE and Identify Historic Properties,

1. The CRM shall determine and document the project APE for each specific undertaking, appropriate to the scope and scale of the undertaking, and considering direct, indirect, and cumulative effects.

2. The CRM shall determine if cultural resource surveys are required for the APE using the following parameters:

a) The CRM shall conduct a literature review for the APE, including its cultural resource inventory list and records of previous surveys, evaluations, and project reviews.

b) The CRM shall visually inspect the APE and update the inventory list, site/building forms and photographic records if necessary. New cultural resource survey is not required in disturbed or previously surveyed areas provided the previous surveys were conducted within the last 10 years. New survey in areas where survey is greater than 10 years will be reviewed by the CRM to determine if additional survey is warranted. If the CRM determines additional survey is not warranted the CRM shall discuss the request with the SHPO via email prior to an official notification letter.

c) If the CRM identifies no historic properties (as defined in 36 CFR § 800.16(1)) within the APE, then the CRM shall document a determination of "No Historic Properties Affected" for inclusion in the Annual Report, and the 75 ABW has no further obligations under this Stipulation.

d) If archaeological or architectural survey is determined necessary, the CRM shall not consult with the SHPO regarding the methodology of the survey as long as the survey is conducted according to the methodology outlined in the most recent installation Integrated Cultural Resources Management Plan and adheres to the most recent SHPO guidance.

e) If the CRM identifies a historic property that may be directly, indirectly, or cumulatively affected within the APE, then the CRM shall continue with the Section 106 review process.

3. Evaluation of Surveyed Cultural Resources,

a) Surveys with no archaeological sites, isolated features or artifacts, or other cultural resources will be defined as negative surveys.

(1) The CRM shall provide reports of negative surveys to Tribes before finalizing the report. If Tribes identify properties of traditional religious and cultural significance, the CRM shall proceed to Stipulation II(B)(3)(b) in the Section 106 Project Review Process.

(2) A list of finalized negative survey reports will be part of the Annual Report, the CRM shall proceed to Stipulation III in the Section 106 Project Review Process.

b) All newly identified cultural resources, and any previously identified but unevaluated cultural resources that could be affected by an undertaking, shall be evaluated by the CRM in accordance with 36 CFR Part 63 and bulletins, guidance, and documents produced by the National Park Service (NPS), in consultation with SHPO, and Tribes, to determine if they are historic properties.

(1) SHPO shall provide a response to the 75 ABW eligibility determinations within 30 calendar days of receipt of all pertinent documentation. If no comments are received within that time, the CRM shall make a second attempt to contact the SHPO for comments. If SHPO does not respond after 14 calendar days, the CRM will assume SHPO concurrence with the 75 ABW determinations.

(2) If SHPO responds that it does not concur with determinations made by the 75 ABW, the parties will attempt to resolve the dispute through additional consultation. If the 75 ABW and SHPO cannot resolve the issue within 30 calendar days, then the 75 ABW shall forward the dispute to the Keeper of the NRHP for resolution at the conclusion of the 30 calendar day period.

(3) The 75 ABW shall consult with Tribes to identify properties of traditional religious and cultural significance (54 U.S.C. 302706) and determine if they are historic properties, in accordance with NPS Bulletin 38.

(4) The CRM does not identify any historic properties within the APE. The CRM shall document this determination of "No Historic Properties Affected" for those undertakings for inclusion in the Annual Report, and the 75 ABW has no further obligations under this Stipulation.

(5) If the CRM identifies a historic property that may be directly, indirectly, or cumulatively affected within the APE, the CRM shall continue on in the Section 106 Project Review Process.

C. Evaluate Effects of the Undertaking,

1. The CRM shall assess the effects of the proposed undertaking on historic properties, including direct, indirect, and cumulative effects, using the criteria of adverse effects (36 CFR. § 800.5(a)(1)) and will make one of the following determinations:

a) "No Historic Properties Affected:" if the CRM determines that historic properties present in the APE will not be affected by the undertaking, the CRM shall document this determination in the Annual Report for those undertakings for inclusion in the official record, and the 75 ABW has no further obligations under this Stipulation.

b) "No Adverse Effect to Historic Properties:" if the CRM determines that historic properties present in the APE will not be adversely affected by the undertaking, and the undertaking is not included in Appendix A, the CRM shall proceed to Stipulation II(C)(2).

c) "Adverse Effect to Historic Properties:" if the CRM determines that historic properties present in the APE will be adversely affected by the undertaking, the CRM shall proceed to Stipulation II(C)(3).

2. No Adverse Effect to Historic Properties,

a) For those undertakings with a finding of "No Adverse Effect to Historic Properties" aside from "Excluded Actions" (Appendix A) noted in this PA, the CRM shall provide the SHPO with a packet of information including, but not limited to, the following:

(1) project description, approximate square footage, and if available, the depth and amount of ground disturbance anticipated;

(2) APE map showing the location of the project and of any identified historic properties;

(3) description of the historic properties affected;

(4) any current photos, when available, unless security restrictions prevent sharing of photographs; and

(5) finding of effect and request for concurrence on "No Adverse Effect to Historic Properties" finding from SHPO.

b) SHPO shall provide a response to the 75 ABW effect determination within 30 calendar days of receipt of all pertinent documentation. If no comments are received within that time, the CRM shall make a second attempt to contact the SHPO for comments. If SHPO does not respond after 14 calendar days, the 75 ABW will assume SHPO concurrence with the 75 ABW determinations.

(1) If the SHPO concurs with the "No Adverse Effect to Historic Properties" finding, the CRM shall document this concurrence for inclusion in the official record, and the 75 ABW has no further obligations under this Stipulation.

(2) If the SHPO does not concur with the finding of "No Adverse Effect to Historic Properties," the CRM shall consult with the SHPO for no more than a total of 30 calendar days, or other time period as agreed to between SHPO and the CRM, upon receipt of SHPO notification of non-concurrence to attempt to resolve concerns as identified by the SHPO.

(a) If at the end of the 30 calendar days, or agreed to specified time, the SHPO concurs with the finding of "No Adverse Effect to Historic Properties," the CRM shall document this concurrence for inclusion in the Annual Report, and the 75 ABW has no further obligations under this PA.

(b) If at the end of the 30 calendar days, or agreed to specified time, the SHPO does not concur with the finding of "No Adverse Effect to Historic Properties," the CRM shall notify the ACHP in accordance with Stipulation IV, *Dispute Resolution*.

3. Adverse Effect to Historic Properties,

a) For those undertakings with a finding of "Adverse Effect to Historic Properties" the CRM shall provide the SHPO with a packet of information including, but not limited to, the following:

(1) project description, approximate square footage, and if available, the depth and amount of ground disturbance anticipated;

(2) APE map showing the location of the project and of any identified historic properties;

(3) description of the historic properties affected;

(4) any photos, as necessary and when available, unless security restrictions prevent sharing of photographs; and

(5) finding of effect and request for concurrence on "Adverse Effect to Historic Properties" finding from SHPO.

b) SHPO shall provide a response to 75 ABW effect determination within 30 calendar days of receipt of all pertinent documentation. If no comments are received within that time, the CRM shall make a second attempt to contact the SHPO for comments. If SHPO does not respond after 14 calendar days the 75 ABW will assume SHPO concurrence with the 75 ABW determinations.

(1) If the SHPO concurs with the adverse effects finding, the CRM shall proceed to Stipulation II(D).

(2) If the SHPO does not concur with the finding of adverse effects, the CRM shall consult with the SHPO for no more than a total of 30 days, or other time period as agreed to between SHPO and the CRM, upon receipt of SHPO notification of non-concurrence to attempt to resolve concerns as identified by the SHPO.

(a) If at the end of the 30 days, or agreed to specified time, the SHPO concurs with the finding of adverse effects, the CRM shall proceed to Stipulation II(D).

(b) If at the end of the 30 days, or agreed to specified time, the SHPO does not concur with the finding of "Adverse Effect to Historic Properties", the CRM shall notify the ACHP in accordance with Stipulation IV, *Dispute Resolution*.

D. Resolution of Adverse Effects,

1. The CRM shall notify Consulting Parties and public within 30 calendar days of receiving the SHPO's concurrence of an adverse effect finding for an undertaking using the following process:

a) The CRM shall prepare and send a notification package for the Consulting Parties including a description of the undertaking, an illustration of the APE, a list of identified historic properties within the APE, the explanation for the finding of adverse effects, steps taken or considered by 75 ABW to avoid or minimize the adverse effects, any SHPO comments received by 75 ABW regarding the undertaking, an invitation to participate in a consultation to resolve adverse effects, and the proposed date for a Consulting Parties meeting.

b) Consulting Parties are under no obligation to provide comments on the effect determination; however, if they wish 75 ABW to consider their comments regarding the effect determination, Consulting Parties must submit comments in writing within 30 calendar days of receipt. If no comments are received within that time, the CRM shall make a second attempt to contact the Consulting Parties for comments and if they wish to participate in the resolution of adverse effects. 75 ABW shall take any comments received into consideration before concluding the consultation and will notify the SHPO of any concerns and the 75 ABW response to those concerns.

2. The CRM shall organize a consultation meeting, if necessary, to include the SHPO, 45 calendar days after notifying Consulting Parties, to discuss alternatives to avoid, minimize, or mitigate the adverse effects. Additional meetings shall be scheduled as needed.

3. If through consultation with the SHPO and Consulting Parties alternatives are identified which will avoid adverse effects resulting from the undertaking, the CRM will document the alternatives to be utilized in order to reach a no adverse effects and seek concurrence with all participating Consulting Parties. The CRM will include this documentation in the official record, and 75 ABW has no further obligations under this Stipulation.

4. If through consultation with the SHPO and Consulting Parties the adverse effects are minimized or mitigated, then the measures agreed to by 75 ABW, the SHPO, and Consulting Parties can be specified in a Memorandum of Agreement (MOA) in accordance with 36 CFR § 800.6(c) and filed with the ACHP upon execution.

5. If the 75 ABW, in consultation with the SHPO, agrees that no prudent or feasible alternatives exist to implementing the undertaking, the 75 ABW, Consulting Parties, and the SHPO may decide to utilize one or more of the Standard Mitigation Treatment Measures as outlined in Appendix B in lieu of a MOA.

6. The ACHP will only participate in the resolution of adverse effects for individual undertakings if a written request is received from 75 ABW, the SHPO, or a Tribe.

III. ANNUAL REPORT

A. The Annual Report reviewed by the BCE and submitted to the SHPO annually will include all undertakings not otherwise previously consulted on and those that utilized Excluded Actions (Appendix A), determinations of "No Historic Properties Affected," the use of Standard Mitigation Treatment Measures (Appendix B), and a list of negative reports.

1. The Annual Report shall be due on 30 January of each year after the signing of the PA unless an alternative date is agreed upon by the CRM and the SHPO.

2. If either the CRM or the SHPO determines a meeting is required to discuss the Annual Report, a date and time shall be scheduled within 30 calendar days of the report being submitted to the SHPO.

B. The following are required features of the Annual Report.

1. A heading noting critical report data, including but not limited to the Spreadsheet Title, AF Region, Installation, and time period reported.

2. A spreadsheet of all agreed upon activities (noted in Section III.A) with relevant information falling into the following categories:

a) Installation

b) Historic Building Number/ID or Archaeological Site Number

c) Project Title

d) CRM

e) Review Date

f) Assessment of Effect

g) Applied Stipulation/Excluded Action

h) Documentation Method

i) Records Location

IV. DISPUTE RESOLUTION

A. Should any signatory to this PA object at any time to any actions proposed or the manner in which the terms of the PA are implemented, the BCE shall consult with such party, and other consulting parties as appropriate, to resolve the objection. If the BCE determines that such objection cannot be resolved, the 75 ABW/CC shall:

1. Forward all documentation relevant to the dispute, including the 75 ABW's proposed resolution, to the ACHP. The ACHP shall provide the 75 ABW/CC with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the 75 ABW/CC shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories and concurring parties, and provide them with a copy of this written response. The 75 ABW/CC will then proceed according to its final decision.

2. If the ACHP does not provide its advice regarding the dispute within the 30 calendar-day period, the 75 ABW/CC may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the 75 ABW/CC shall prepare a written response that takes into account any timely comments regarding the dispute from signatories to the PA, and provide them and the ACHP with a copy of such written response.

B. The 75 ABW's responsibility to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

C. Should any member of the public raise a timely and substantive objection pertaining to the manner in which the terms of this PA are carried out, at any time during its implementation, the BCE shall consider objection by consulting with the objector to resolve the matter. When the BCE responds to an objection, it shall notify the consulting parties of the objection, and the manner in which it was resolved. The BCE may request assistance from consulting parties to resolve such an objection.

V. AMENDMENTS

This PA may be amended when such an amendment is agreed to in writing by all Signatories. The amendment will be effective on the date a copy signed by all Signatories is filed with the ACHP.

VI. TERMINATION

A. If any Signatory to this PA determines that its terms will not or cannot be carried out, the Signatory shall immediately consult with the other parties to attempt to develop an amendment per Stipulation V, *Amendments*. If within 30 calendar days, or another time period agreed to by all Signatories, an amendment cannot be reached, any Signatory may terminate the PA upon written notification to other signatories.

B. Once the PA is terminated, the 75 ABW must review all undertakings identified post termination in accordance with 36 CFR §§ 800.3 through 7.

VII. SUNSET PROVISIONS

This PA will remain in full force and effect until December 31, 2032. The 75 ABW, the SHPO, and the ACHP shall review the PA at least 180 calendar days prior to the date this PA would otherwise expire for possible modifications, termination, or extension.

VIII. ANTI-DEFICIENCY ACT

Nothing in this PA shall be interpreted to require any obligation or payment of funds in violation of the Anti-Deficiency Act (31 U.S.C. 1341). If for that reason the 75 ABW/CC is unable to carry out the terms of this PA, the 75 ABW/CC shall advise the ACHP and SHPO and comply with all requirements of 36 CFR §§ 800.3 through 7.

Execution of this PA by the 75 ABW/CC, the SHPO, and the ACHP, and implementation of its terms, is evidence that the 75 ABW/CC has taken into account the effects of its actions on historic properties and has satisfied its NHPA Section 106 responsibilities for all individual undertakings of the program addressed herein.

This PA may be executed in counterparts, each of which shall constitute execution of the overall agreement.

**PROGRAMMATIC AGREEMENT AMONG
THE UNITED STATES AIR FORCE 75TH AIR BASE WING,
THE UTAH STATE HISTORIC PRESERVATION OFFICE,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING OPERATIONS, MAINTENANCE, AND DEVELOPMENT ACTIVITIES AT
HILL AIR FORCE BASE, UTAH TEST AND TRAINING RANGE,
AND LITTLE MOUNTAIN TEST FACILITY, UTAH**

75TH AIR BASE WING

By: _____ Date: 16 DEC 2022
JEFFREY G. HOLLAND, Colonel, USAF
Commander

PROGRAMMATIC AGREEMENT AMONG
THE UNITED STATES AIR FORCE 75TH AIR BASE WING,
THE UTAH STATE HISTORIC PRESERVATION OFFICE,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING OPERATIONS, MAINTENANCE, AND DEVELOPMENT ACTIVITIES AT
HILL AIR FORCE BASE, UTAH TEST AND TRAINING RANGE,
AND LITTLE MOUNTAIN TEST FACILITY, UTAH

UTAH STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: 9/30/22

CHRIS MERRITT
Utah State Historic Preservation Officer

**PROGRAMMATIC AGREEMENT AMONG
THE UNITED STATES AIR FORCE 75TH AIR BASE WING,
THE UTAH STATE HISTORIC PRESERVATION OFFICE,
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AND LITTLE MOUNTAIN TEST FACILITY, UTAH**

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: Jordan E. Tennenbaum Date: December 22, 2022
JORDAN E. TENNENBAUM
Vice Chairman

APPENDIX A
Excluded Actions

The 75 ABW, in consultation with the SHPO and the ACHP, has determined the following activities meet the criteria for exclusion so long as they have no adverse effect on character defining features. The SHPO concurs that these activities will not require project review by the SHPO pursuant to Stipulation II but will be documented by the 75 ABW as part of the Annual Report. For the purposes of this agreement, the terms "in-kind repair" or "in-kind replacement" are defined as installation of a new element that duplicates the material (historic or modern equivalent), dimensions, design, texture, configuration, and detailing of the original or historic element or feature.

a. Non-Physical/Administrative Activities [Stipulation II(A)]

a. Grants or loans to participants for working capital, equipment, furniture, fixtures, debt refinancing, and acquisition of building for reuse.

b. Projects consisting of grants or loans to be applied to the purchase (down payment, mortgage prepayment, and/or closing costs) of buildings.

c. Acquisition of real property (including air rights, water rights, and other interests therein), which is limited to the legal transfer of ownership with no physical improvements proposed.

d. Relinquishment of real property (including air rights, water rights, and other interests therein) to another federal agency.

e. Planning-related studies and administrative/engineering/design costs.

f. Energy audits and feasibility studies.

g. Architectural and engineering fees.

b. Ineligible Properties

a. Demolition, rehabilitation, or new construction on a property that has been determined not eligible for listing in the National Register and that eligibility determination concurred on by the SHPO, except when proposed work to an existing property or new construction may impact a surrounding historic building, archaeological site, or district.

c. No-Go Areas

a. If the APE is located within or contains parts identified as No-Go areas, Appendix C, these actions are exempt from cultural resource inventory for health and safety reasons.

d. Improvements and Maintenance

a. Runway upgrades and construction: Upgrading, resurfacing, repairing existing runways, recognizing the constant need to maintain and modify these features to meet current and future Air Force Missions so long as it does not affect attributes to historic properties

(including eligible and listed sites or districts) and occurs in areas that have been previously surveyed (within the last 10 years), or areas with previous ground disturbance.

b. Road Improvement/Maintenance: Upgrading, resurfacing, or rehabilitation of existing roads, streets, alleyways, driveways, curbs, sidewalks, hike/bike trails, park improvements, parking areas, steps not attached to buildings, or other public improvements, except where historic materials, i.e., features which are at least fifty (50) years old, retain their integrity from the historic period, and exhibit distinctive materials, methods of construction, or elements of design that do/would contribute to the character of a historic property (including eligible or listed districts), and are being replaced or resurfaced with other materials, or where new (or extensions of existing) streets or alleyways encroach on properties, park strips, or landscaped medians fifty (50) years of age or older.

c. Utilities: Repair or replacement of existing water, gas, electrical, telephone, storm, and sewer lines, or installation of new lines in areas where no new ground disturbance will occur or where it is completely contained within previous disturbance.

d. Landscaping: Planting, removal, or trimming of trees, sod installation, and other landscaping except on historic properties where landscaping or setting is a contributing element to the property's listing or eligibility on the National Register of Historic Places, or where a sprinkling system will spray onto the historic building.

e. Fencing and Walls: Repair or replacement of fencing and walls when work is done in-kind to match existing historic material and form.

f. Temporary Barriers: Installation of temporary and /or reversible barriers as a result of another independent project or short-term security feature.

g. Signs: installation of signs in accordance with state and federal regulations.

h. Security and safety upgrades: Installation of roadway security and safety features such as bollards, speedbumps, and ramps in areas of existing disturbance. Painting, sign installation, and security marking in paved areas for safety purposes such as crosswalks, fire zones, and parking spots. Installation of security features on buildings or structures such as cameras, vindicator access points, lighting, and lightning protection systems on historic properties. Upgrades to internal modern rooms within historic properties to meet safety and security requirements. Installation of blast-resistant windows and security doors does not fall within this exemption.

i. Soil boring/well testing in established areas: Installation of new soil boring holes or wells in areas of previous survey or existing disturbance. New survey in areas where survey is greater than 10 years will be reviewed by the CRM for determination on if additional survey is warranted.

j. Guzzler Maintenance: in areas that have been previously surveyed (within the last 10 years), or in areas of previous ground disturbance. New survey in areas where survey is greater than 10 years will be reviewed by the CRM for determination on if additional survey is warranted.

k. Wildland Firebreak Maintenance: in areas that have been previously surveyed (within the last 10 years), or in areas of previous ground disturbance. New survey in areas where survey is greater than 10 years will be reviewed by the CRM for determination on if additional survey is warranted.

l. Reseeding in established areas: in areas that have been previously surveyed (within the last 10 years), or areas with previous ground disturbance. New survey in areas where survey is greater than 10 years will be reviewed by the CRM for determination on if additional survey is warranted.

m. Environmental clean-up/soil removal in areas of previous disturbance or existing landfills.

e. Exterior Rehabilitation

a. Temporary Features: Installation of scaffolding. Temporary stabilization that causes no permanent damage to the building or site, including installation of temporary bracing, shoring, and tarps.

b. Replacement of Storm Windows & Doors: Installation of storm windows and doors provided they are anodized or painted to match the trim and windows with horizontal and vertical divisions that align with the existing window divisions.

c. Replacement of Existing Mechanical Systems: Placement and installation of exterior heating, ventilating or air conditioning (HVAC) mechanical units and vents, provided any exterior HVAC mechanical units at the front of the building are screened from public view. Placement and installation of power meters or generators.

d. Replacement of Existing Bulkhead Doors: Installation, replacement, or repair of basement bulkhead doors.

e. Pest Control: Control of insects, rodents, or other pests when the method does not visibly impact the historic fabric of the building.

f. Window Covering: Installation of removable film on windows (if the film is transparent), solar screens, or window louvers, in a manner that does not harm or obscure historic windows or trim. Replacement of window tinting on buildings where such tinting already exists.

g. Replacement of Existing Foundation Vents: Installation of foundation vents, if painted or finished to match the existing foundation material.

h. Exterior maintenance and repair made with in-kind materials and that do not affect the external appearance and building fabric, including but not limited to the following:

    i. Structural: Repair and in-kind replacement of foundations and structural members such as floor joists, ceiling joists, roof rafters, and walls.

ii. Exterior Paint: Application of exterior paint, other than on previously unpainted masonry. Removal of exterior paint by non-destructive means, limited to hand scraping, low-pressure water wash of less than 400 psi, heat plates or hot air guns, chemical paint removal.

iii. Lead Paint Treatment: Exterior lead paint treatment that includes scraping and repainting of exterior wood and masonry surfaces in accordance with the National Park Service's Preservation Brief 3 7, *Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing.*

iv. Caulking & Glazing: Installation of caulking that matches the color of adjacent surfaces of the building; weather-stripping, re-glazing and repainting of windows.

v. Masonry Cleaning: Cleaning of masonry surfaces with low-pressure water and detergent (less than 400 psi) after a test patch has been done on an inconspicuous location to ensure the masonry will not be damaged. Sandblasting will never be used on masonry.

vi. Repointing: Repointing of masonry and stone if the old mortar is removed by hand, i.e., no power saws and the new mortar is the same color, tooling and strength as the historic mortar, as per the guidelines in Preservation Brief #2.

vii. Siding & Trim: Repair or replacement in-kind of existing exterior siding and trim.

viii. Porches: Repair or replacement in-kind of existing porch elements such as columns, flooring, floor joists, ceilings, railing, balusters and balustrades, and lattice.

ix. Roofs: Repair or replacement in-kind of historic roofing, with material which closely matches the existing material and form. In-kind replacement is recommended, but compatible substitute materials, including architectural composition shingles, can be used with the goal to match the historic material in design, color, texture, and other visual qualities.

x. Windows and Doors: Repair or replacement in-kind of existing historic windows and doors, or replacement of non-historic windows and doors with windows and doors that match the size, color, profile and configuration of the historic windows and doors and are compatible with the visual qualities and historic character of the building. Replacement of historic windows, historic doors, and door frames that closely resemble the existing on elevations not visible from the public right-of-way.

xi. Accessibility: Maintenance, repair, or in-kind replacement of accessibility improvements such as wheelchair ramps, but not including exterior elevators.

xii. Awnings: Repair or replacement in-kind of historic awnings. Removal of metal awnings, except where the awnings have been deemed to be a contributing element of the historic property.

xiii. Gutters: Repair, replacement, or installation of gutters and downspouts. Replacing existing profiles with a more historic profile (i.e., replacing K-style with half round or square where appropriate). Installation of heat tape.

f. Interior Rehabilitation

a. Interior Finishes: Refinishing and repair in-kind of interior finishes. Replacement of non-historic interior finishes.

b. Plaster and Drywall: Repair and replacement in-kind of plaster walls and ceilings. Installation of drywall where original plaster wall surfaces are missing and where the installation of drywall will not appreciably change the trim profile.

c. Floors and Floor Coverings: Repair and refinishing of interior floors. Replacement of damaged material in-kind. Installation of carpeting and other floor coverings provided that installation does not damage underlying wood or masonry floor surfaces.

d. Doors and Trim: Refinishing, repair, or replacement of interior doors and trim in-kind. Replacement of non-significant flat stock trim with material to match historic pattern if known or to be compatible with the property's historic character.

e. Cabinetry, Countertops and Appliances: Refinishing, repair, replacement, or installation of cabinetry and countertops as long as it does not affect the property's character. Repair, replacement, or installation of appliances as long as it does not alter character-defining features.

f. Structural: Repair, replacement, or installation of new interior structural elements which do not intersect windows.

g. Plumbing: Repair, replacement, or installation of new plumbing lines and fixtures.

h. Electrical: Repair, replacement, or installation of new electrical lines, equipment, and fixtures.

i. Mechanical Systems: Repair, replacement, or installation of new HVAC systems and their components, including ventilation, provided that such work does not alter character-defining features.

j. Insulation: Replacement or installation of insulation provided it can be accomplished without permanent visual changes in the decorative interior (e.g., plaster, woodwork) and/or exterior finish materials (e.g., siding, masonry) and that it is installed with appropriate vapor barriers. The proposed use of urea-formaldehyde insulation and exterior "blow-in" insulation are not exempt from review.

k. Security Features and Building Controls: Installation or replacement of security devices. Installation of building control devices such as photo/card controls, occupancy sensors, fire-smoke-carbon monoxide detectors, thermostats, humidity, light meters and other building control sensors.

l. Lead Paint Treatment: Treatment methods of lead paint hazards as required by local, state, and/or federal law; not to include removal/replacement of historic features.

m. Asbestos Abatement: Treatment methods of asbestos hazards as required by local, state, and/or federal law; not to include removal/replacement of historic features. Updates to previously modified/modern interiors that do not impact the historic character, and updates to non-permanent internal layouts (e.g., cubicles/etc.)

g. Demolition

a. Removal and disposal of collapsed building debris and rubble not attached to any structure, except where the building debris is determined to be a contributing element of a historic property.

b. Clean-up and removal of modern materials less than 50 years of age trash, refuse, debris, targets, and vehicles.

c. Grading and seeding sites where demolition has already taken place.

h. Operational Retrieval of Objects

a. Standard Object Retrieval Actions: This exclusion applies to all mission and/or proponent retrieval activities of objects which are initiated within 62 miles (100 kilometers) of the earth's surface (the Kármán line at which outer space begins) at the time the retrieval is initiated. Due to the nature of these activities, exact landing areas are often unknown until impact.

i. Retrieval of standard objects which land within active target complexes will require no further consultation.

ii. If a standard object lands in an area previously surveyed for archaeological resources, the project proponent will record the location of the retrieval activities via current GPS technology and will forward the information to the HAFB CRM who will assess effects of the retrieval action. If the HAFB CRM determines that the retrieval action did not adversely affect historic properties no further consultation is required. If the HAFB CRM finds that a historic property has been adversely affected, the HAFB CRM will document the adverse effect and coordinate with SHPO, consulting parties, and the proponent to implement mitigation through the Standard Mitigation Treatment Measures found in Appendix B.

iii. If a standard object lands in an area that has not been surveyed for historic properties, the project proponent will record the location of the retrieval activities via current GPS technology and forward the information to the HAFB CRM. The

HAFB CRM will determine the APE in consultation with the SHPO, ensure an after-action survey is conducted and documented in an inventory report which meets current SHPO standards. If the HAFB CRM determines that the retrieval action did not adversely affect historic properties, no further consultation is required, and the inventory report will be submitted in accordance with Stipulation III. If the HAFB CRM finds that a historic property has been adversely affected, the HAFB CRM will coordinate with SHPO, consulting parties, and the proponent to implement mitigation through the Standard Mitigation Treatment Measures found in Appendix B.

iv. If a standard object is unique or significant in nature, the HAFB CRM may determine that it's retrieval should be addressed using the procedure for Earth Return Retrieval Actions described in Section h(b) below.

v. All ground disturbing activities will fall under and meet the HAFB Unanticipated Discovery of Archaeological Deposits protocol.

b. Earth Return Retrieval Actions: This exclusion applies to all retrieval activities for objects which are initiated beyond 62 miles (100 kilometers) from the earth's surface or standard objects that the HAFB CRM determines to be unique or significant in nature to warrant further evaluation.

i. Retrieval of earth return objects which land within active target complexes will require no further consultation.

ii. An archaeological monitor must be present on site for all retrieval actions and preparatory groundwork for earth return objects landing outside active target complexes. The APE will be determined by the HAFB CRM in consultation with the SHPO. The archaeological monitor will record the location of the retrieval activities and assess effects to historic properties. If the HAFB CRM determines that the retrieval action did not adversely affect historic properties, no further consultation is required, and the inventory report will be submitted in accordance with Stipulation III. If the HAFB CRM determines that there has been an adverse effect the HAFB CRM will coordinate with SHPO, consulting parties, and the proponent to implement mitigation through the Standard Mitigation Treatment Measures found in Appendix B. In addition, the HAFB CRM, in consultation with SHPO and other consulting parties (as applicable), will determine if the landing site meets National Register eligibility criteria. If so, the site will be fully recorded as such during retrieval and clean-up activities in coordination with the proponent to ensure that all security and safety measures are met. The HAFB CRM will provide a monitoring and recordation report (as applicable) to SHPO and other consulting parties.

iii. The HAFB CRM will review additional actions (i.e. preparatory or investigative actions) associated with retrieval activities to determine if any action is an Excluded Action described in the Appendix. If so, the action will not require any further consultation. If the activity is not an Excluded Action, the HAFB CRM will consult with the SHPO, consulting parties, and the proponent to determine the best course of action to meet Section 106 requirements.

iv. Post review discoveries will be handled in accordance with the HAFB Unanticipated Discovery of Archaeological Deposits protocol.

APPENDIX B
Standard Mitigation Treatment Measures

When avoidance or minimization of adverse effects is not appropriate or feasible, the following standard mitigation treatment measures may be implemented, if agreed upon by all parties, for the resolution of adverse effects. If an undertaking will result in an adverse effect, the 75 ABW, the SHPO, and other participating/coordinating parties may develop a standard mitigation treatment approach that includes one or more of the following measures, depending on the nature of historic properties affected and the severity of the adverse effect. For example, demolition will likely result in multiple mitigation measures while alteration of a minor character-defining feature may be addressed with a single measure. If standard mitigation treatment measures outlined in this appendix cannot be agreed upon or it is found the treatment plan cannot be completed for any reason, a MOA, following the procedures in 36 CFR § 800.6(c), will be executed to resolve the adverse effect.

The 75 ABW shall make a determination that Standard Mitigation Treatment Measures are applicable to a specific undertaking and notify the SHPO. The ACHP will not be notified when Standard Mitigation Treatment Measures are going to be used to mitigate adverse effects under this PA. If the SHPO and the 75 ABW agree in consultation in accordance with Stipulation II(D)(5), the 75 ABW shall send the SHPO and other consulting parties an official letter notifying them that Standard Mitigation Treatment Measures will be used to mitigate adverse effects. The SHPO and other participating parties shall notify the 75 ABW whether they concur or object to the 75 ABW's determination and plan to use Standard Mitigation Treatment Measures within 30 calendar days following receipt of documentation. If the SHPO and other participating parties fail to respond within 30 calendar days, the SHPO and other participating parties will be deemed to concur with the 75 ABW's determination.

1. Recordation, Digital Photograph Package
Prior to project implementation, the 75 ABW's shall oversee the successful delivery of a digital photography package. The digital photography package shall include a comprehensive collection of photographs of both interior and exterior views showing representative spaces and details of significant architectural features and typical building materials. Exterior photographs shall include overall images and images of each elevation. Exterior views shall be keyed to a site plan while interior views shall be keyed to a floor plan of the building/structure. The photographs shall be saved on an archival compact disc and include the date photographed, address, subject matter, photographer's name, and elevation or direction of image. The 75ABW will distribute a digital copy of the photograph package to SHPO and other participating parties.

2. Reconnaissance Survey
The 75 ABW, in consultation with the SHPO, shall develop a non-intensive inventory strategy to identify historic properties and identify an area to conduct the study. Study areas may include high probability areas never before surveyed or any areas of interest to the 75 ABW or the SHPO. The report will include a literature review and may include building or site forms completed according to Utah State History standards. A digital copy of the report and associated forms will be submitted to the SHPO and other participating parties.

3. Intensive Level Survey
An intensive level historic site form providing a historical narrative and physical property description will be completed for the property, including information on outbuildings, if one has not been previously completed. For the detailed description of the physical appearance of the building and its significant architectural features, a brief description is required of any additions or alterations that have been made to

the building; a list and brief description of the materials, estimated dates, and condition; a description of and a note of contributory/non-contributory status of any outbuildings on the property; and a description of any features not adequately shown in the photos. For the historical narrative, write a chronological history of the property, focusing on the original or principal owner and significant events. This must include internal and external elements of the building as well as meet all Utah State ILS standards. In consultation with the SHPO, the survey may or may not include level I or II documentation standards of the Historic American Building Survey/Historic American Engineering Record/Historic American Landscape Survey.

4. Drawings
For architecturally significant or unique buildings, or buildings that can provide important data, the 75 ABW shall prepare two exterior elevation drawings (primary elevation, plus one other that best captures the property) for the primary building. The 75 ABW shall prepare a site plan, drawn to an appropriate scale, showing the primary building and associated outbuildings, fences, and structures. The 75 ABW shall prepare a basic floor plan drawing (for each building level). The drawings may be done electronically or by hand (if done by hand, they must be scanned and submitted electronically).

5. Oral History Documentation
Prior to project implementation, the 75 ABW shall work with the SHPO and other consulting parties to identify oral history, or ethnography, documentation needs and agree upon a topic and list of interview candidates. Once the parameters of the oral history project have been agreed upon, the 75 ABW shall continue to coordinate the project through data collection, drafting of the document (recordings may be allowed), and delivery of a final product.

6. Public Interpretation
Prior to project implementation, the 75 ABW and other consulting parties shall work with the SHPO to design an educational or other public interpretive plan. The plan may include signs, displays, educational pamphlets, websites, workshops, museum displays, and other similar mechanisms to educate and raise awareness with the public on historic properties within the local community or region. Once an interpretive plan has been agreed to by the parties, consultation shall continue throughout implementation of the plan until the 75 ABW has completed all agreed-upon actions. All such projects will go through security screening prior to release to ensure no sensitive material is released.

7. Maps/ Story Maps (Current and Historical)
The 75 ABW shall work with the SHPO and other participating parties to identify historic maps and/or aerial photographs for scanning and geo-referencing. Once a list of maps and/or aerial photographs has been agreed upon, the 75 ABW shall continue the project by scanning and geo-referencing them and shall submit drafts of electronic files to the SHPO and other parties for review. The 75 ABW shall submit final electronic files that include scanned documents (if not created electronically) and the metadata relating to the creation of the maps. A story map detailing aspects of the installation's history or prehistory may also be developed to be utilized for defined purposes (including but not limited to project planning, public outreach, installation training). All such projects will go through security screening prior to release to ensure no sensitive material is released.

8. NRHP Nomination or Historic Context
The 75 ABW shall work with the SHPO and other participating parties to identify individual properties that would benefit from a completed NRHP Nomination, either close in proximity to the project or historically related to the properties being affected, to be listed in the NRHP; or, the 75 ABW shall identify properties that may be related to existing historic themes associated with the property to develop

into a formal historic context statement. Once the parties have agreed to a property, the 75 ABW shall continue to work the SHPO through the drafting of the nomination form. The SHPO shall provide guidance during the preparation of the form and shall submit the nomination to the Keeper for inclusion in the NRHP. The 75 ABW shall use staff or contractors that meet the Secretary's Professional Qualifications.

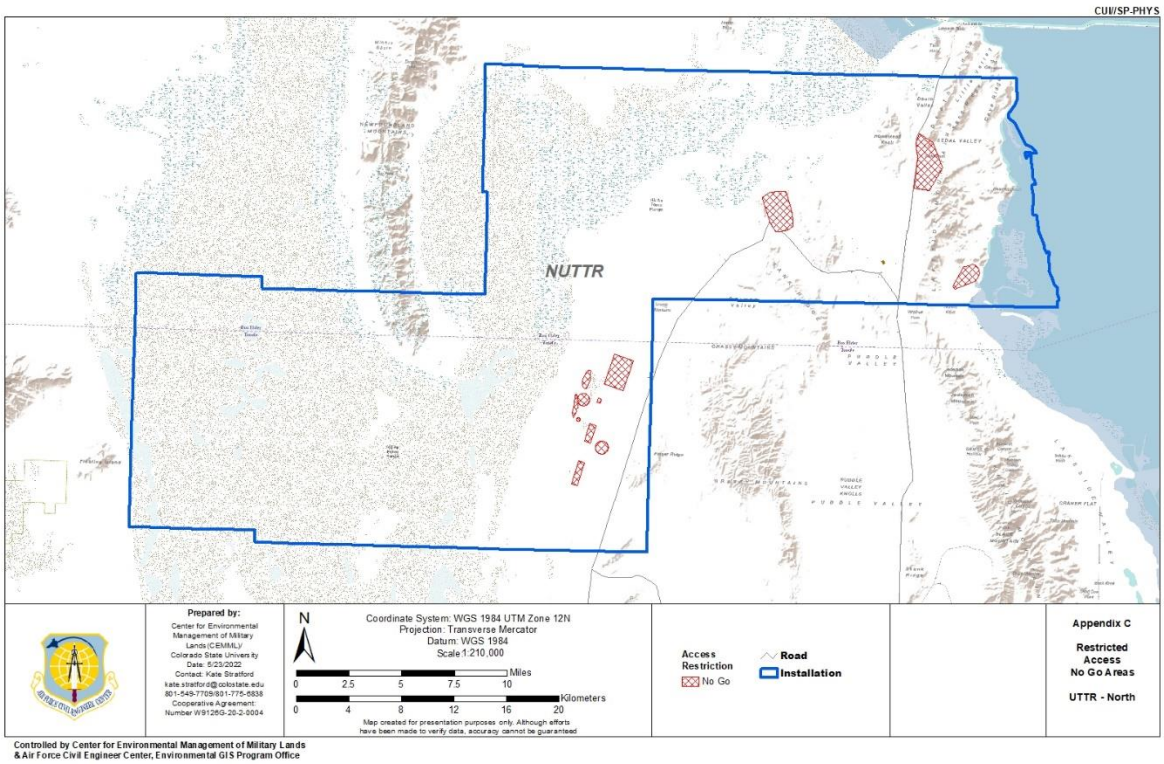
9. Multiple Property Submission

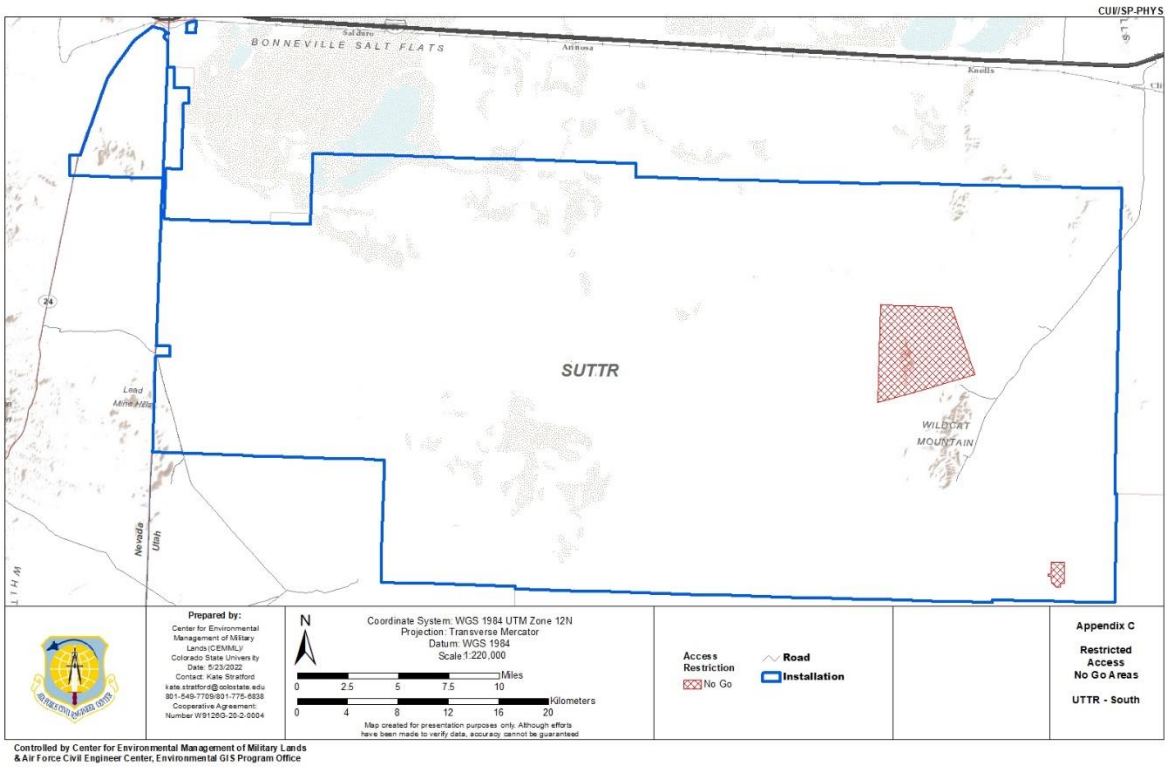
The 75 ABW shall seek to identify properties that are associated with significant historic themes to develop a Multiple Property nomination (the organization and nomination of a group of related significant properties based on themes, trends, and/or patterns of history shared by the properties). Once the parties have agreed to a property, the 75 ABW shall continue to work with the SHPO through the drafting of the nomination form. The SHPO shall provide guidance during the preparation of the form and shall submit the nomination to the Keeper for inclusion in the National Register. The 75 ABW shall use staff or contractors that meet the Secretary's Professional Qualifications.

10. Historic Preservation Workshops

The 75 ABW shall, in consultation with the SHPO and other consulting parties, offer or sponsor a public or internal workshop to raise awareness and understanding of historic preservation standards and practices. Ideally, the workshop will be related to the project activity resulting in the adverse effect. For example, the decision to replace historic windows with incompatible windows may result in offering a window restoration workshop.

APPENDIX C
No-Go Areas

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BONNEVILLE SALT FLATS
Saltaire
Arinosa
Knolls
SUTTR
WILDCAT MOUNTAIN
Lead Mine Hills
Nevada
Utah
24
Prepared by:
Center for Environmental Management of Military Lands (CEMML)/ Colorado State University
Date: 5/23/2022
Contact: Kate Stratford
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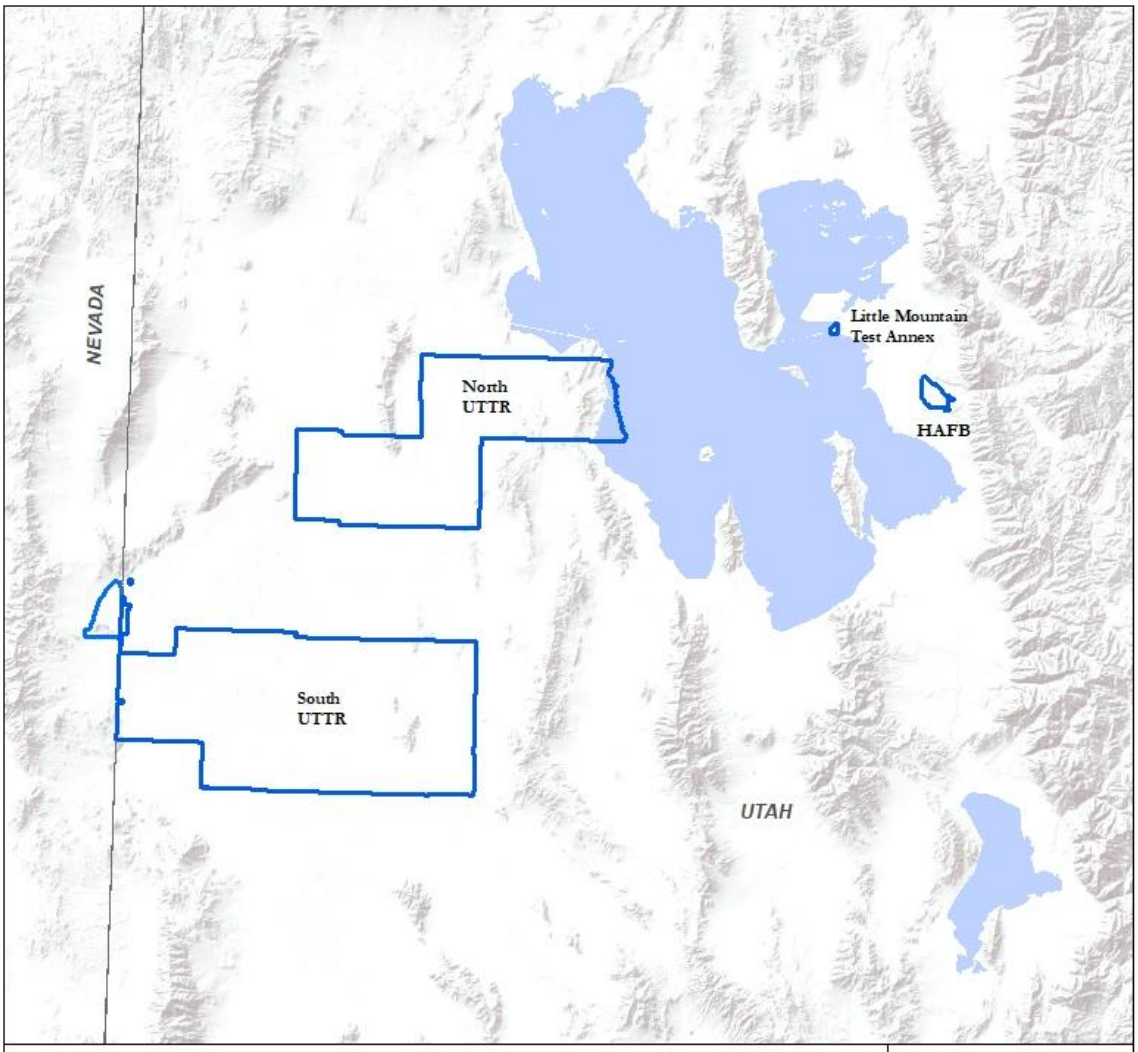
801-549-7709/801-775-5838
Cooperative Agreement Number W9126G-20-2-0004
Coordinate System: WGS 1984 UTM Zone 12N
Projection: Transverse Mercator
Datum: WGS 1984
Scale 1:220,000
Miles
0 2.5 5 7.5 10
Kilometers
0 4 8 12 16 20
Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed
Access Restriction
No Go
Road
Installation
Appendix C
Restricted Access No Go Areas
UTTR - South
Controlled by Center for Environmental Management of Military Lands & Air Force Civil Engineer Center, Environmental GIS Program Office

APPENDIX D
Area of Potential Effect



Installation Boundary

Appendix D

Hill AFB
Administered Lands

Prepared by:
Center for Environmental Management of Military Lands (CEMML)/
Colorado State University
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Contact: Kate Stratford
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N

Coordinate System: WGS 1984 UTM Zone 12N
Projection: Transverse Mercator
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Scale: 1:1,190,000

Miles
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Kilometers
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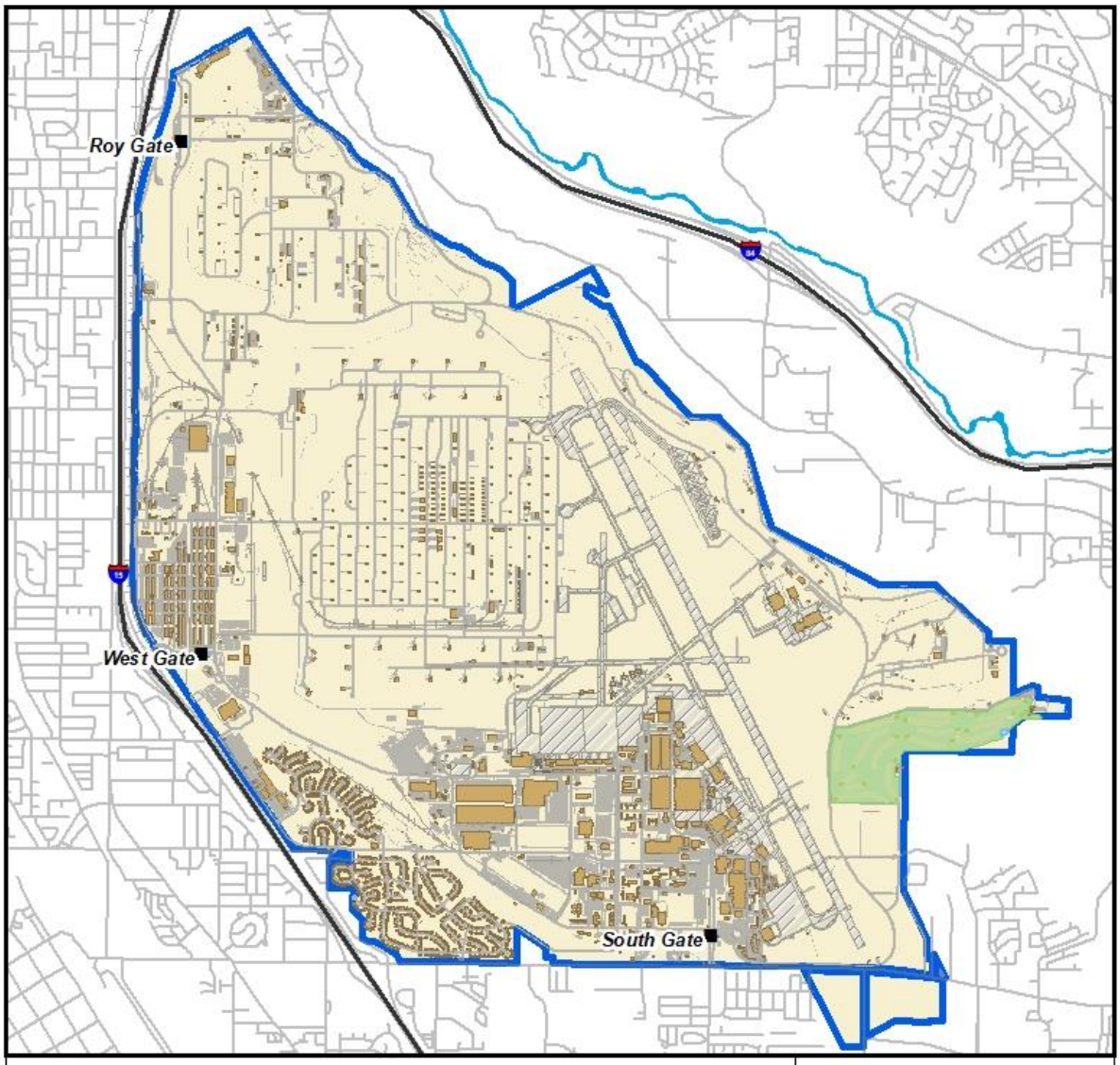
Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed



Building
Installation

Appendix D
Hill AFB

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N

Coordinate System: WGS 1984 UTM Zone 12N
Projection: Transverse Mercator
Datum: WGS 1984
1:40,000

Miles
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Kilometers
0 0.5 1 2 3

Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed

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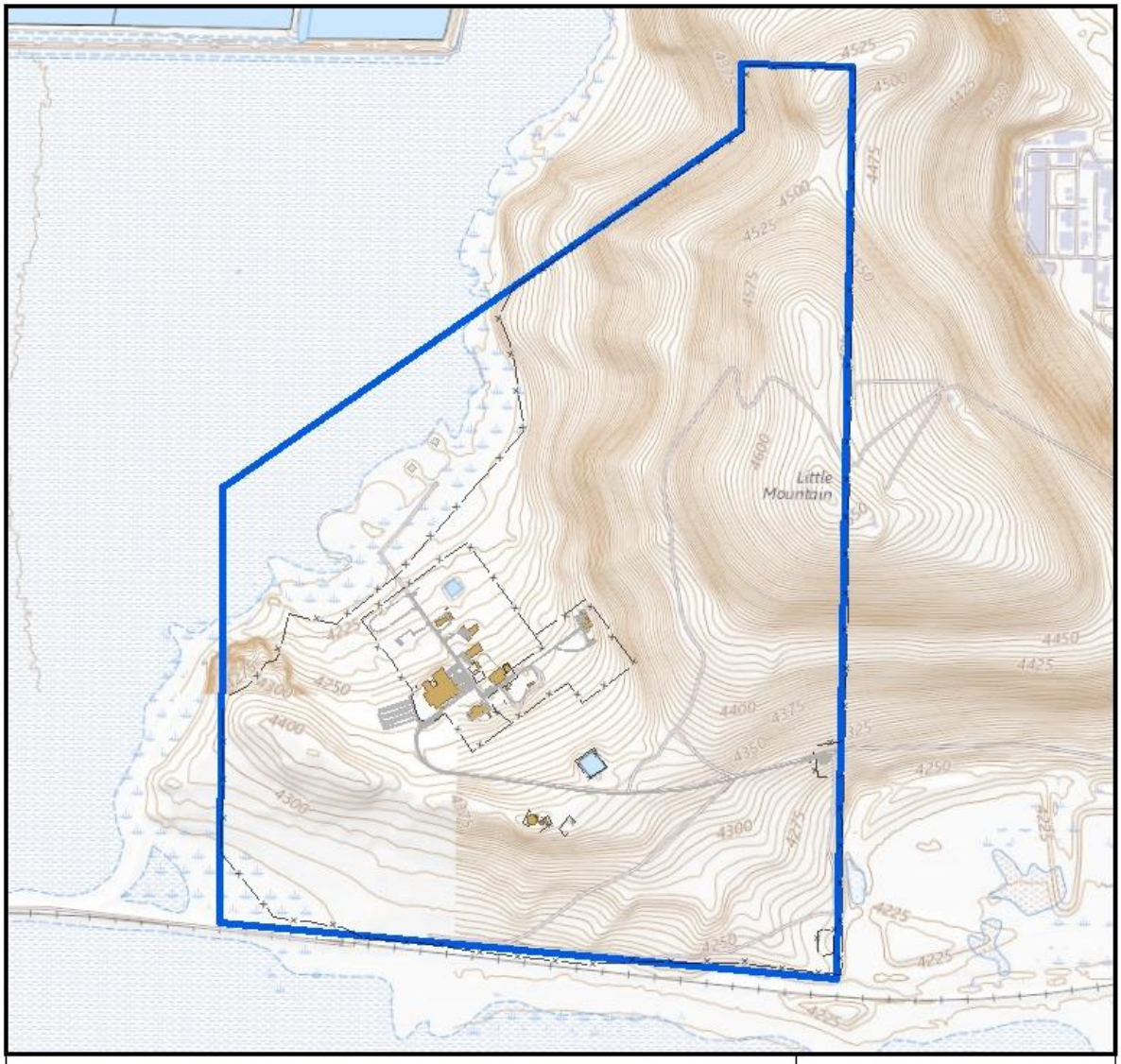

Building
Installation

Appendix D
Little Mountain
Text Annex

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N
Coordinate System: WGS 1984 UTM Zone 12N
Projection: Transverse Mercator
Datum: WGS 1984
1:14,000

0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed

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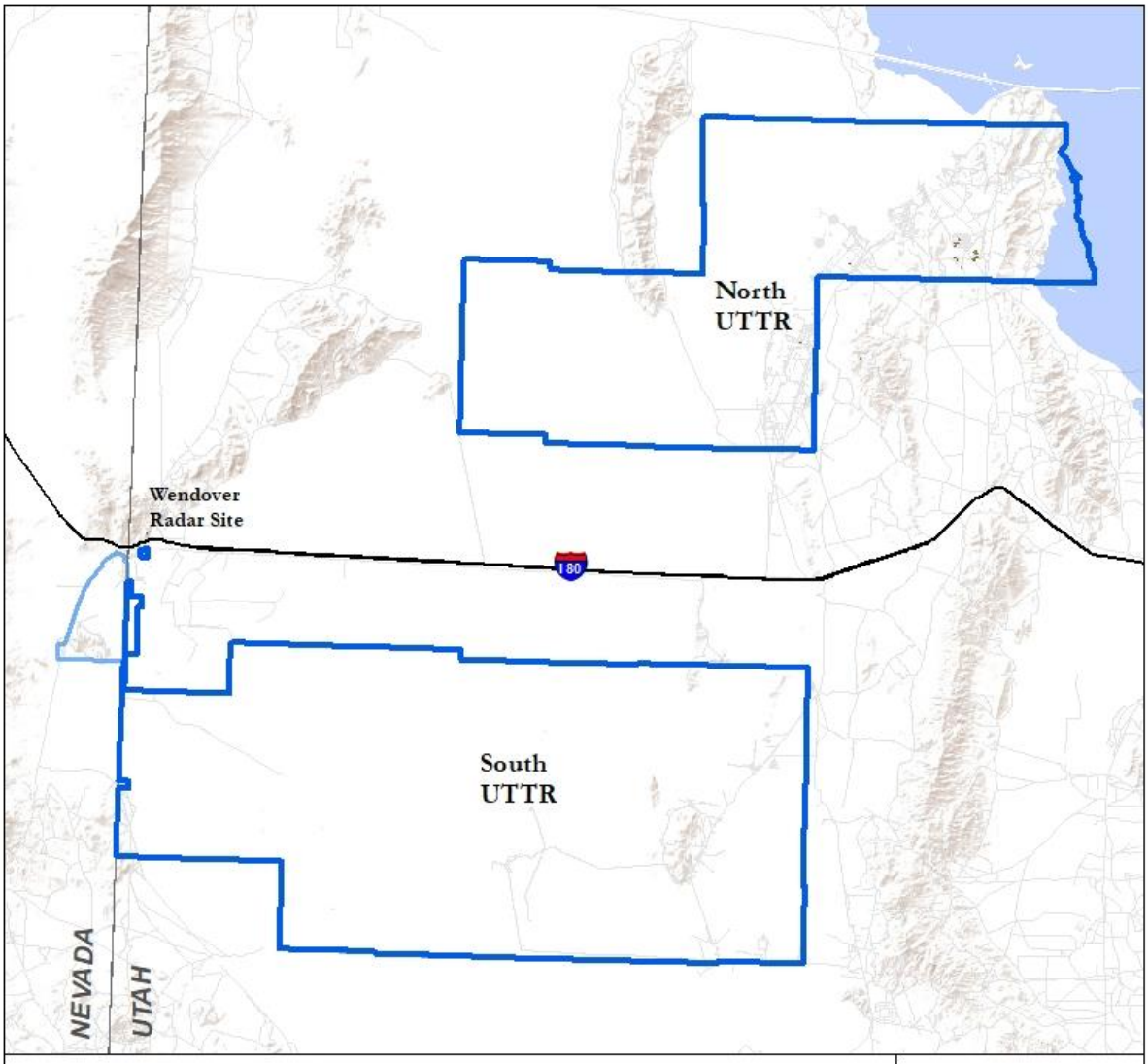

Appendix D

Utah Test and Training Range

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N

Coordinate System: WGS 1984 UTM Zone 12N
Projection: Transverse Mercator
Datum: WGS 1984
Scale 1:625,000

Miles
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Kilometers
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Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed