

FINDING OF NO SIGNIFICANT IMPACT BOEING COMMERCIAL SPACE TRANSPORT LANDING US ARMY DUGWAY PROVING GROUND, DUGWAY, UTAH

Pursuant to the *National Environmental Policy Act* (NEPA) of 1969 and the Council on Environmental Quality regulations (40 CFR Sec. 1500-1508) implementing the procedural provisions of NEPA, the US Army gives notice that a Supplemental Environmental Assessment (SEA) has been prepared for landing operations for the Boeing Commercial Space Transport (CST) at US Army Dugway Proving Ground (DPG), Utah. The SEA is incorporated by reference. Based on the SEA it has been determined that an environmental impact statement is not required.

PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is to support the Orbit Flight Test and Crewed Flight Test landing operations of the Boeing CST. Landings are expected to be conducted starting in Spring 2019. Test landing activities would be conducted on DPG. The No Action Alternative was evaluated in the EA. Three alternative test sites were considered and subsequently eliminated from further analysis.

FINDINGS

The following paragraphs summarize the anticipated environmental impacts from implementing the Proposed Action.

Air Resources. There would be short-term temporary increases in dust-up pollutants from landing activities and a negligible increase in vehicle emissions. No long-term or significant impacts would occur.

Geological Resources. The proposed action involves limited use of off-road vehicles on existing terrain. It is not anticipated that the action would significantly impact the geology of the test area.

Water Resources. Water resources are scarce in this high desert environment and no significant impacts to water quality or quantity would result from the Boeing CST test.

Biological Resources. Because of the vastness of similar habitat, any impact from human disturbance will not be significant. No federally-listed threatened or endangered species are known to inhabit the playa habitat and none were identified during field surveys. Appropriate mitigation efforts and off-set surveys will be conducted to comply with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Cultural Resources and Native American Concerns. Initial surveys identified archaeological sites in the landing test area. The landing of the CST command module is not expected to cause a significant impact to the archaeological sites in the area. Impacts to archaeological sites during recovery operations will be avoided or minimized by ensuring that off road vehicle use will be limited in scope and will use established

ingress/egress routes. An archaeological monitor during recovery operations will ensure significant adverse impacts on cultural resources will be avoided.

Hazardous Materials. Small amounts of hydrazine may be onboard the Boeing CST when it lands from low Earth orbit. In the unlikely event the fuel compartment is ruptured, immediate clean-up would be performed. No significant environmental impact is expected from hazardous materials.

Solid and Hazardous Waste. Only small amounts of solid or hazardous waste would be produced from Boeing CST testing. This will not create a significant environmental impact.

Airspace. The Federal Aviation Administration and the National Air and Space Administration would coordinate landings of the Boeing CST from low orbit. Existing airspace coordination and scheduling procedures should prevent air traffic conflicts over DPG and the Utah Test and Training Range (UTTR). This will not create a significant environmental impact.

Visual Resources. Impacts to visual resources would not be considered significant because of the low impact to the salt playa and sandy areas of the test sites and their location on Department of Defense (DoD) ranges. No significant impacts were identified.

Transportation. The increase in vehicular traffic associated with Boeing CST testing activities would be minor and would not increase traffic congestion or cause excessive wear to public roads.

Noise. Because the test site underlies military airspace and is located on active military ranges where noise levels from aircraft, missiles, and artillery are already sporadically high, but because of the remoteness of DPG, no significant noise impacts are expected. Sonic boom analysis has been performed for the Boeing CST landings. Sonic booms would not significantly impact DPG or neighboring communities.

Socioeconomics. Small beneficial impacts to local economies would occur, because of the influx of landing personnel and other participants to the area (i.e., lodging, restaurants, entertainment, and affiliated industries).

Environmental Justice. There would be no adverse significant or disproportionate impacts to minority, low-income populations, or to children from implementing the Boeing CST program at DPG if this project is approved.

Land Use. The Boeing CST program is consistent with existing operations at DPG. Land use would not be significantly impacted.

Cumulative Effects. Effects of the Proposed Action would not significantly contribute to or cause significant cumulative impacts on environmental resources in the area of DPG, UTTR, and the West Desert, Utah.



WDTC Document No. WDTC-OPS-ENA-070

**SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR BOEING
COMMERCIAL SPACE TRANSPORT LANDING AT
US ARMY DUGWAY PROVING GROUND, DUGWAY, UTAH**

MICHAEL M. ROBINSON
Environmental Technology Office
Operations Division
West Desert Test Center

US ARMY DUGWAY PROVING GROUND
DUGWAY, UT 84022-5000

March 2019

Environmental Technology Office
Operations Division
West Desert Test Center
US Army Dugway Proving Ground
Dugway, UT 84022-5000



100%
TOTAL RECOVERED FIBER
10% POSTCONSUMER FIBER

DPW-EN DOC ID: WDTC-OPS-ENA-070

Table of Contents

FINDING OF NO SIGNIFICANT IMPACT BOEING COMMERCIAL SPACE TRANSPORT LANDING US ARMY DUGWAY PROVING GROUND, DUGWAY, UTAH..... 3

CHAPTER 1. PURPOSE AND NEED FOR ACTION..... 4

1.1 BACKGROUND4

1.2 PURPOSE.....6

1.3 NEED6

1.4 TIERING.....7

1.5 PROCESS8

CHAPTER 2. DESCRIPTION OF THE PROPOSED ACTION..... 9

2.1 BOEING CST-100 STARLINER LANDING PROGRAM9

CHAPTER 3. ALTERNATIVES CONSIDERED 13

3.1 ALTERNATIVES13

3.2 NO ACTION ALTERNATIVE13

3.3 CONDUCT TEST AT X-4 PAD.....13

3.4 CONDUCT TEST AT URBAN TEST GRID.....13

3.5 SELECTION CRITERIA16

CHAPTER 4. AFFECTED ENVIRONMENT 18

4.4. BIOLOGICAL RESOURCES19

4.5 CULTURAL RESOURCES22

CHAPTER 5. ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION 27

5.1 GEOLOGY AND SOILS29

5.2 WATER.....30

5.3 AIR QUALITY.....32

5.4 BIOLOGICAL RESOURCES33

5.5 SOCIO-ECONOMIC CONDITIONS37

5.6 ENVIRONMENTAL JUSTICE38

5.7 LAND USE39

5.8 CULTURAL RESOURCES40

5.9 TRAFFIC AND TRANSPORTATION41

5.10 VISUAL RESOURCES43

5.11 NOISE.....43

5.12 SONIC BOOM ANALYSIS.....45

5.13 HEALTH AND SAFETY.....46

5.14 WASTE MANAGEMENT50

5.15 ENERGY52

5.16 CLIMATE.....53

5.17 DEPARTMENT OF TRANSPORTATION ACT SECTION 4(F)54

5.18 INDIRECT EFFECTS55

5.19 CUMULATIVE EFFECTS.....55

CHAPTER 6. CONCLUSIONS 57

CHAPTER 7. LIST OF PREPARERS, AGENCIES AND PERSONS CONSULTED 59

CHAPTER 8. REFERENCES 61

APPENDIX A. BOEING CST PUBLIC MEETING PRESENTATION..... A-1

APPENDIX B. PUBLIC MEETING COMMENTS B-1
APPENDIX C. PUBLIC COMMENTS RECEIVED C-1
**APPENDIX D. THREATENED, ENDANGERED, AND SPECIES-AT-RISK LIST FOR US
ARMY DUGWAY PROVING GROUND (DPG), UTAH D-1**
**APPENDIX E. US FISH AND WILDLIFE SERVICE BIRDS OF CONSERVATION CONCERN
IN THE GREAT BASIN E-1**

CHAPTER 1. PURPOSE AND NEED FOR ACTION

1.1 BACKGROUND

The US Army Dugway Proving Ground (DPG) operates under direction of the US Army Test and Evaluation Command (ATEC). The US Army Garrison Dugway is part of the Installation Management Command (IMCOM) and operates the Garrison and provides mission support. The primary mission of DPG is performed by the West Desert Test Center (WDTC), a Department of Defense (DoD) Major Range and Test Facility Base (MRTFB). The WDTC tests agents of biological origin (ABO) and chemical warfare agent (CWA) detection, identification, avoidance, protection, and decontamination equipment for war fighters and first responders and develops tactics, techniques and procedures (TTPs) in these respective areas. This mission includes toxic industrial chemicals (TICs) and toxic industrial materials (TIMs). The mission of DPG has expanded to include development of tactics, techniques, and procedures in support of current and potential theater operations that enhance war fighter ability to survive and win on the battlefield. In September 2009, the Rapid Integration and Acceptance Center (RIAC) for unmanned aircraft systems (UAS) was established at DPG and it is now the consolidated center for UAS testing for the US Army. The proving ground encompasses 797,974 acres located in the remote western desert area of Utah, approximately 80 miles southwest of Salt Lake City, Utah, and approximately 40 miles southwest of Tooele, Utah.

DPG, at the request of the National Aeronautical and Space Administration (NASA) and the Boeing Corporation, is proposing to support the testing and development of the Commercial Space Transport 100 (CST-100) Starliner as part of NASA's Commercial Crew Development (CCDev) initiative. The CST-100 Starliner is a spacecraft/system designed to affordably, reliably, and safely transfer crew from the Earth's surface to orbiting space complexes in low earth orbit, including the International Space Station (ISS), and return them safely back to Earth.

The Commercial Crew Transportation System (CCTS) has requirements for test landing sites, which include: the Orbital Flight Test (OFT) and the Crewed Flight Test (CFT). DPG is being asked to support the OFT and the CFT as a potential Primary Landing Site (PLS) and Back-up Landing Site (BLS), in the case of a wave off of the nominal landing site. DPG may also be used on short notice as an emergency landing site should an emergency on the Starliner or ISS require the crew to return before the site can be supported by the full Boeing Landing Recovery Team. This document describes the vehicle, the desired support to augment the Boeing Landing Recovery Team, and the desired mission support posture for all potential phases of the OFT and CFT.

The CCTS supports developing markets in Low Earth Orbit (LEO). The initial customer is NASA's ISS. The CCTS launches flight crew and cargo from Launch Complex (LC) 41 at the Cape Canaveral Air Force Station (CCAFS) in Florida, maneuvers in orbit to rendezvous with its destination, docks at the destination for up to 210 days, returns with either a primary land landing or a contingency sea landing, and is recovered and potentially refurbished for reuse. Orbital operations are controlled from a ground-based mission control center. Prelaunch operations and manufacturing support are provided by ground based facilities.

The CCTS system consists of three segments: Commercial Crew Vehicle (CCV) segment, launch segment, and ground segment. Boeing's CCV segment is the CST-100 Starliner. The CST-100 Starliner includes the Crew Module (CM) and Service Module (SM). This segment

supports the flight crew through launch, on-orbit, and return operations. The launch segment includes the launch vehicle, the Launch Vehicle Adaptor (LVA), Spacecraft to launch vehicle integration, pad test and checkout. The Ground Systems segment includes the integration facility, test facilities, mission operations center, network services, cargo handling systems, landing, and recovery systems, and training systems and mock-ups. The CM is the only part of the vehicle that lands at Dugway.

DPG, with its high desert terrain, provides a unique location to accomplish the OFT and CFT. Dugway adjoins the US Air Force's massive Utah Test and Training Range (UTTR). Together they cover 2.3 million remote acres (2,624 square miles) of Department of Defense land, an effective zone to safely land the OFT and CFT missions. Dugway and the UTTR have restricted access, that is, only pre-approved access by those without an official reason to be present. The OFT and CFT testing would be conducted on the playa north of Goodyear Road and northwest of the Urban Test Grid. Determination of the PLS and BLS will be contingent on the weather and ground conditions.

Boeing is considering four additional Starliner landing sites: Edwards Air Force Base in California, Ft. Huachuca's Willcox Playa in Arizona, and White Sands Missile Range in New Mexico (which has two landing sites). Separate Environmental Assessments (EAs) are being developed for those locations. Other landing sites were evaluated, but failed to meet one or more of the criteria required for a landing site.

The following NEPA documents analyze the potential environmental consequences of launching the Starliner atop the Atlas V rocket from LC-41 at CCAFS. These contain the affected environments and environmental impacts for the ULA Atlas V rocket operations at CCAFS. Therefore, Atlas V launch impacts are not discussed in this Supplemental EA (SEA).

- *Final Environmental Impact Statement for the Evolved Expendable Launch Vehicle Program* (April 1998).
- *Final Supplemental Environmental Impact Statement for the Evolved Expendable Launch Vehicle Program* (March 2000).
- *Commercial Crew Transportation System Environmental Assessment for the Boeing Starliner Launch from Cape Canaveral Air Force Station and Landing and Recovery at the US Army White Sands Missile Range.*

Three federal agencies are directly involved in the preparation of this SEA: DPG, NASA, and the Federal Aviation Administration (FAA). DPG is acting as the lead agency and is responsible for ensuring overall compliance with applicable environmental statutes, including NEPA. As the landowner of the proposed landing sites, the Army is responsible for its real property assets and infrastructure in support of the landing and recovery of the Starliner spacecraft at Dugway. A support contract is in development between Boeing and DPG for Army support to the proposed action. NASA provides oversight for current commercial space and technology development-related activities, and is responsible for establishing and coordinating activities outlined in the proposed action. NASA is a cooperating agency in the preparation of this SEA.

The FAA's Office of Commercial Space Transportation licenses and regulates US commercial space launch and reentry activity, as well as the operation of non-Federal launch and reentry sites, as authorized by chapter 509 of Title 51 of the US Code covering commercial space launch activities. The mission of the FAA's Office of Commercial Space Transportation is to ensure protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities, and to encourage, facilitate,

and promote US commercial space transportation. The FAA expects to receive a reentry license application from Boeing for reentering and landing the Starliner at DPG. Because of its role in licensing commercial space launches and reentry of launch vehicles, the FAA is a cooperating agency in the preparation of this SEA.

1.2 PURPOSE

The purpose of this NASA and Army Action is to support specified portions of Boeing CST-100 Starliner test landings at DPG. Coordinated landings for the OFT and CFT would be conducted beginning in 2018.

The purpose of the FAA's anticipated action in connection with Boeing's expected request for a reentry license is to fulfill the FAA's responsibilities as authorized by chapter 509 of Title 51 of the US Code for oversight of commercial space launch activities, including licensing launch and reentry activities.

1.3 NEED

The Boeing CST-100 Starliner is a manned space aircraft, which requires the capability to safely dock on orbit and return to Earth for landing (see Figure 1-1). The OFT will demonstrate the ability to launch to orbit and safely return and land on Earth. These requirements and procedures will be further developed to support the CFT and mission landings. Currently, the United States has no spacecraft to transport crews and equipment to low orbit. The CST-100 Starliner will meet this need.

The need for FAA's Proposed Action results from the statutory direction from Congress under the US Commercial Space Launch Competitiveness Act of 2015 to, in part, "promote commercial space launches and reentries by the private sector; facilitate Government, State, and private sector involvement in enhancing US launch sites and facilities; [and] protect public health and safety, safety of property, national security interests, and foreign policy interests of the United States." Pub. L. 114-90, §113(b). Additionally, Congress has determined the Federal Government is 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." 51 USC § 50901(b)(4).

Figure 1-1 Boeing CST-100 Starliner



1.4 TIERING

Similar testing activities at DPG and their environmental effects have been addressed and analyzed in the following NEPA documents:

- *Record of Decision for Final Environmental Impact Statement for Activities Associated with Future Programs at U.S. Army Dugway Proving Ground*, 15 November 2004.
- *Final Environmental Impact Statement for Activities Associated with Future Programs at U.S. Army Dugway Proving Ground, Utah*, 14 November 2004.
- National Aeronautics and Space Administration (NASA) *Stardust [Spacecraft] Mission Finding of No Significant Impact*, 07 May 1998.
- *Environmental Assessment for Range Capabilities Improvements in Support of Development of TTPs at U.S. Army Dugway Proving Ground*, June, 2011.
- *Installation Environmental Assessment for United States Army Dugway Proving Ground, Dugway, Utah*, Updated January 1979.
- *Record of Consideration for First Article Test and Ballistic Lot Acceptance Test of the M314A3 Projectile, Metal Parts, 105-mm Illuminating at U.S. Army Dugway Proving Ground, Dugway, Utah*, June 2004.
- *Environmental Assessment for Boeing Commercial Space Transport Testing at U.S. Army Dugway Proving Ground, Dugway, Utah*, 13 April 2016.

- *Record of Environmental Consideration for Boeing Drag Test and Soil Samples at U.S. Army Dugway Proving Ground, Utah, December 2017.*

This SEA is tiered from these documents. These documents, as well as the 2016 update of the *DPG Integrated Natural Resource Management Plan (INRMP)* (DPG 2016) and the *DPG Integrated Cultural Resource Plan (ICRMP)* (DPG 2001), are incorporated, where appropriate, by reference into this SEA (CEQ, Sec. 1502.21). Tiering from these documents [via Records of Environmental Consideration (REC)] and this SEA, once approved, would be used to eliminate repetitive discussions of the same issues, exclude issues already decided upon from consideration, and to focus on the actual issues being addressed in this environmental review (CEQ, Sec. 1502.20 and Sec. 1508.28).

1.5 PROCESS

This SEA was developed through a systematic, interdisciplinary, and collaborative approach to evaluate the use of existing rangelands on DPG, consistent with Proposed Action selection criteria and resource category significance criteria, for CST-100 Starliner test landing operations and potential impacts or effects that such activities may have on the environment and human health. The public was briefed on conduct of the Boeing CST tests and landings at public meetings held in Dugway, Tooele, Trout Creek, Salt Lake City, and Wendover, Utah (see Appendix A). Comments and concerns were solicited and received (see Appendix B). These comments and concerns will be addressed in this document (see Appendix B).

This SEA has been prepared in compliance with the following: the National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] §4321 et seq.), Council on Environmental Quality (CEQ) NEPA-implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508); 32 CFR Part 651, *Environmental Analysis of Army Actions*; the Procedures of Implementation of NEPA for the National Aeronautics and Space Administration (14 CFR part 1216 subparts 1216.1 and 1216.3); the NASA Procedural Requirement (NPR) for Implementing NEPA and Executive Order (EO) 12114 (NPR 8580.1); and FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. This SEA assesses impacts of the proposed action, discusses alternatives, and provides this information to the decision maker so an informed decision can be made to proceed or not to proceed with the proposed action. This SEA is prepared with the intention to adhere to the NEPA policy in Section 101 of fostering and promoting the general welfare by creating and maintaining conditions under which man and nature can exist in productive harmony to fulfill social, economic, and other requirements of present and future generations of Americans.

1.6 DECISION

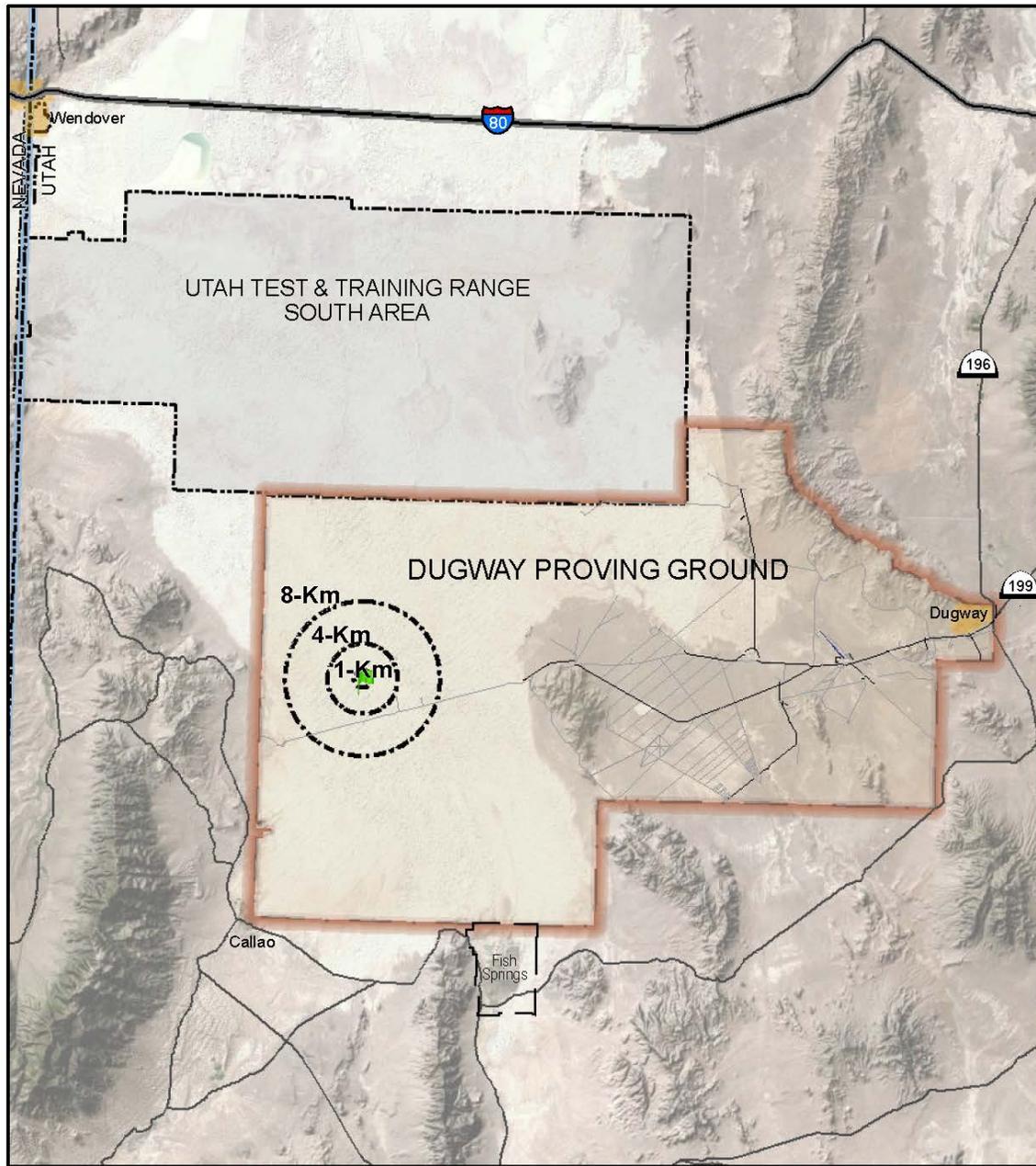
Upon review and consideration of this SEA, the Commander will decide whether to approve the proposed action and location for test landing the CST-100 Starliner, postpone the selection of a CST-100 Starliner test landing site until another suitable site can be determined, or to take no action and continue current test and development of tactics, techniques, and procedures (TTPs) operations without conducting CST-100 Starliner test landings.

CHAPTER 2. DESCRIPTION OF THE PROPOSED ACTION

2.1 BOEING CST-100 STARLINER LANDING PROGRAM

- 2.2** The proposed action of this NEPA SEA is to support CST-100 Starliner OFT and CFT landing requirements. This would include support for Starliner landing support crews, medical support teams, ground recovery operations, and sonic boom analysis. Landing test efforts would be conducted starting in 2019. As mentioned in Section 1.1, in order for Boeing to conduct commercial Starliner missions, Boeing will have to obtain a reentry license from the FAA. The FAA anticipated action of issuing Boeing a reentry license for Starliner reentries and landings at DPG is considered part of the proposed action analyzed in this EA.
- 2.3** Dugway Proving Ground would support OFT and CFT testing. OFT landings are scheduled for 2019. The majority of the support would be staged on existing roads and current facilities and the off-road impact is planned to be minimal.
- 2.4** Four Boeing CST-100 Starliner test efforts are planned to be conducted on DPG, within installation boundaries (see Figure 2-1 Proposed Test Landing Area and Site). The proposed test area for OFT landings and CFT landings is an area which includes the west area of DPG, covering approximately 49,683 acres in the west desert ranges. This large land mass would accommodate heat shields and other pieces of the spacecraft that would be jettisoned and fall to earth prior to touch-down of the CST-100. The command module would land within a one kilometer radius, the larger jettisoned items would land within an eight kilometer radius covering approximately 49,683 acres (see Figure 2-1 Proposed Test Landing Area and Site, Figure 2-2 Proposed Test Landing Site and Figure 2-3 Jettisoned Item Monte Carlo Model [Mean Conditions], below). On the planned day of landing, weather data would be evaluated at both the PLS and BLS. In order to ensure all the pieces of the Starliner land within the approved landing zone, weather limits would be established for the landing sites. Should the data show an exceedance of the weather limits at the PLS, a decision would be made whether to land at the BLS (assuming it has favorable weather) or wave off the landing to a later opportunity when conditions are favorable. Should the data show an exceedance at both the PLS and BLS, the landing would be waved off to a later opportunity. These controls would ensure the Starliner and jettisoned pieces stay within the landing zone. Ingress and egress routes would be established and an archaeologist would be present to assist with ground recovery operations and to ensure no cultural resources would be affected.

Figure 2-1. Proposed Test Landing Area and Landing Site



This map was produced by TED-T-DPW-0-PM
 SPD_CS-T-100_FONSI_2-1.mxd - 26 Nov 2018

0 5 10 Miles

FIGURE 2-1

LANDING AREA & SITE



Figure 2-2. Proposed Test Landing Site

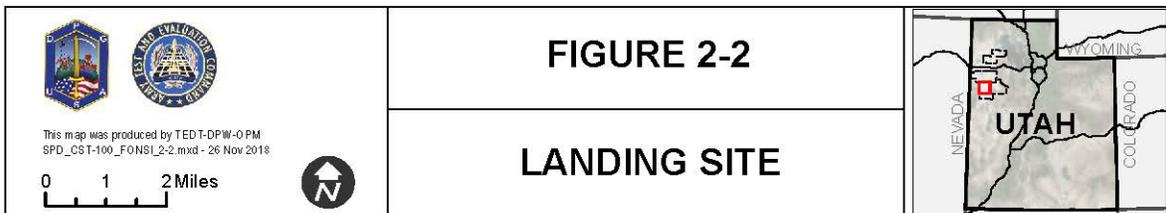
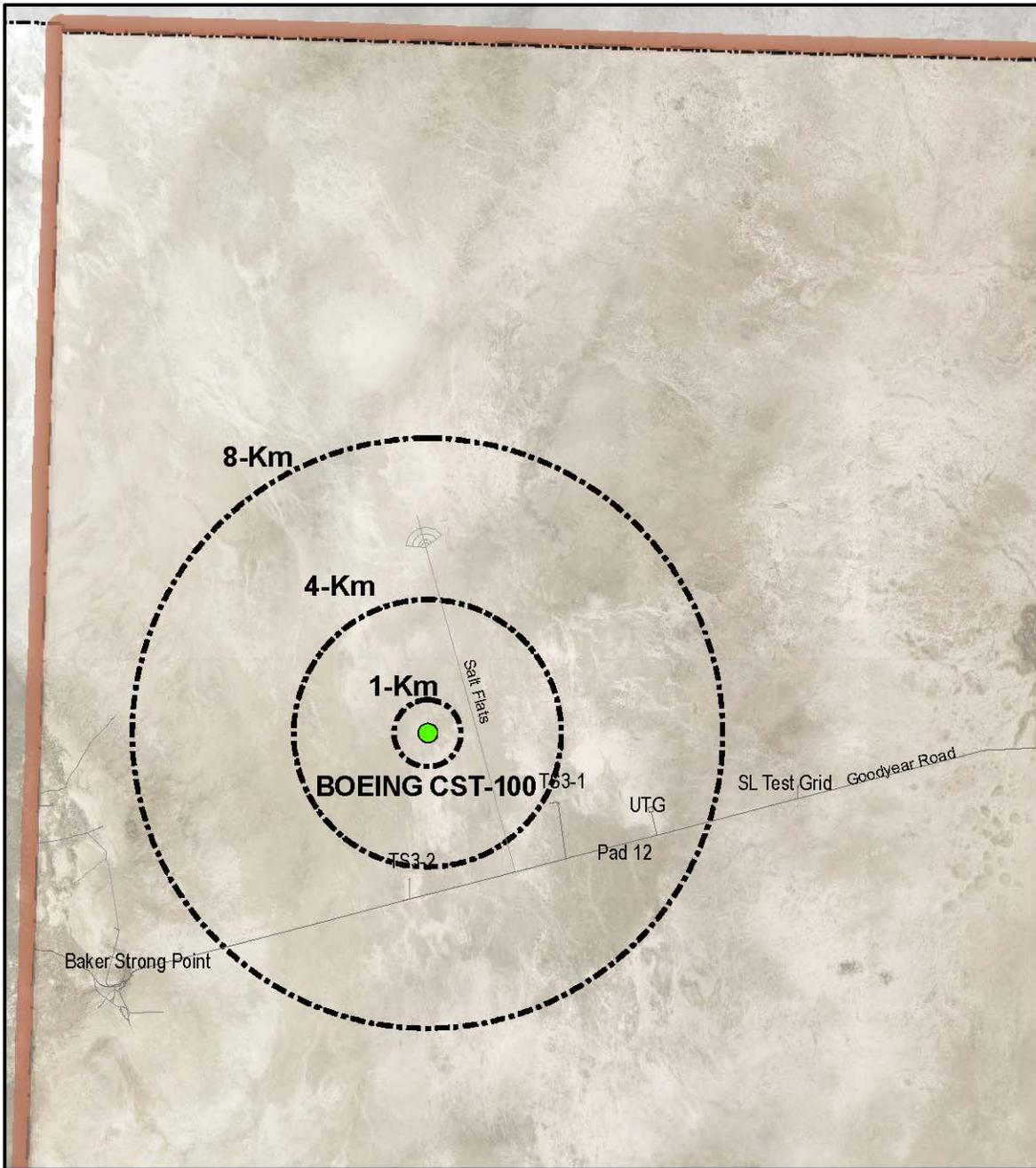
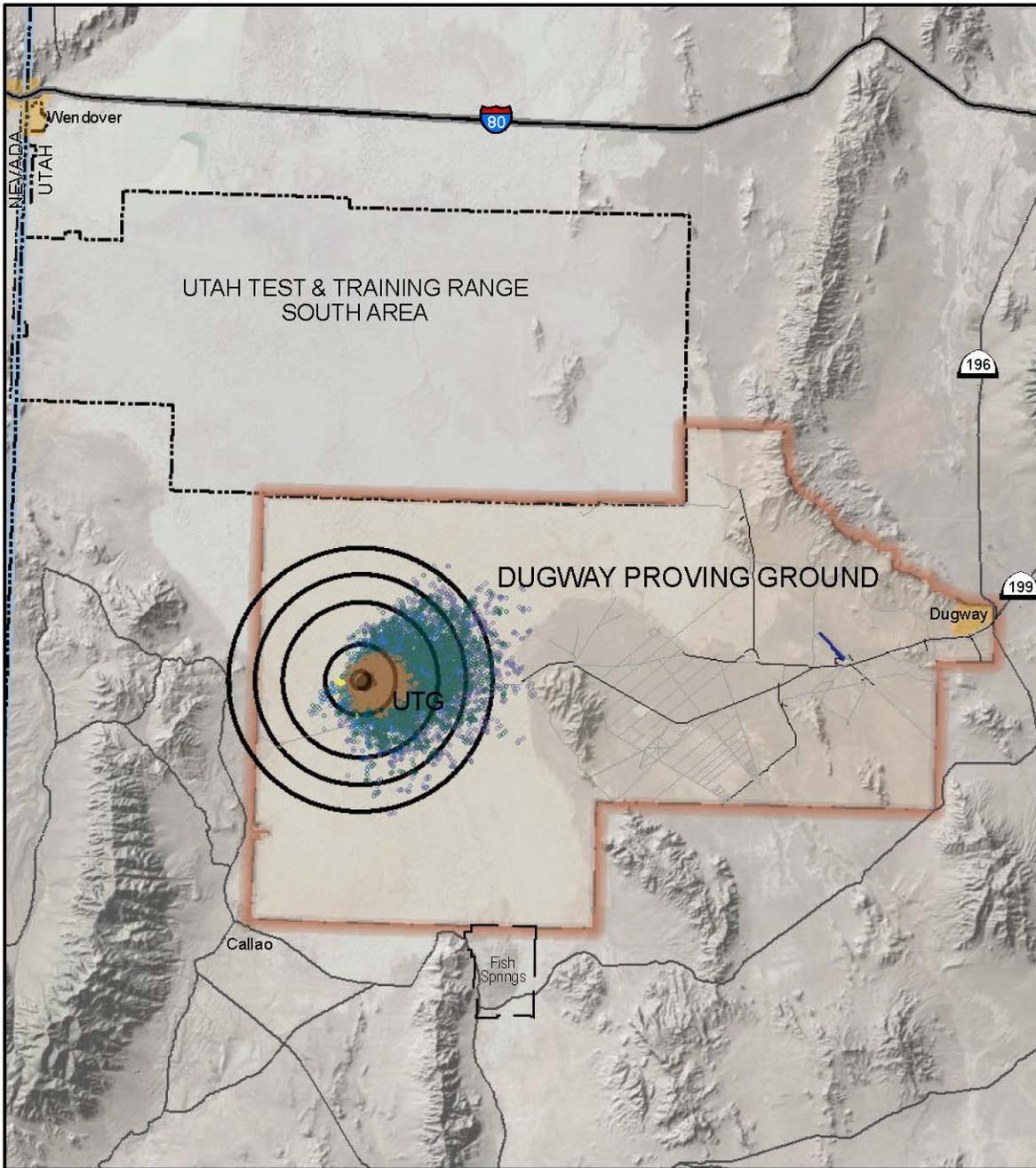


Figure 2-3. Jettisoned Item Monte Carlo Model (Mean Conditions)



 <p>This map was produced by TED T-DPW-0 PM SPD_CST-100_FONS L2-3.mxd - 26 Nov 2018</p> <p>0 5 10 Miles</p> 	<p>FIGURE 2-3</p> <p>JETTISON AREA</p>	
--	--	---

CHAPTER 3. ALTERNATIVES CONSIDERED

3.1 ALTERNATIVES

The test customer has determined that DPG will be one of five landing sites. The other proposed sites are White Sands Missile Range (2 landing locations), New Mexico; Wilcox, Arizona; and Edwards Air Force Base, California (see Figure 3-1 Designated Land Sites).

Three alternatives to the proposed action were considered at DPG. One of these alternatives was to take no action and continue current test and development of TTPs operations without conducting CST-100 testing. The other alternatives were to conduct Boeing CST-100 testing at two other sites on DPG (see Figure 3-2 Alternate Sites Considered at DPG). However, new information on the landing space requirements necessitated a change of the landing site from UTG to a site northwest of UTG, as depicted in Figures 2-1, 2-2 and 2-3.

3.2 NO ACTION ALTERNATIVE

The No Action Alternative for this SEA is not to conduct the Boeing CST-100 test Program and follow on landing operations. Under this alternative, the FAA would not issue Boeing a reentry license for Starliner operations at DPG.

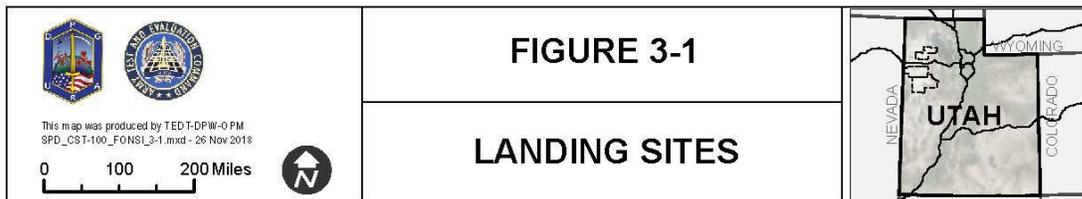
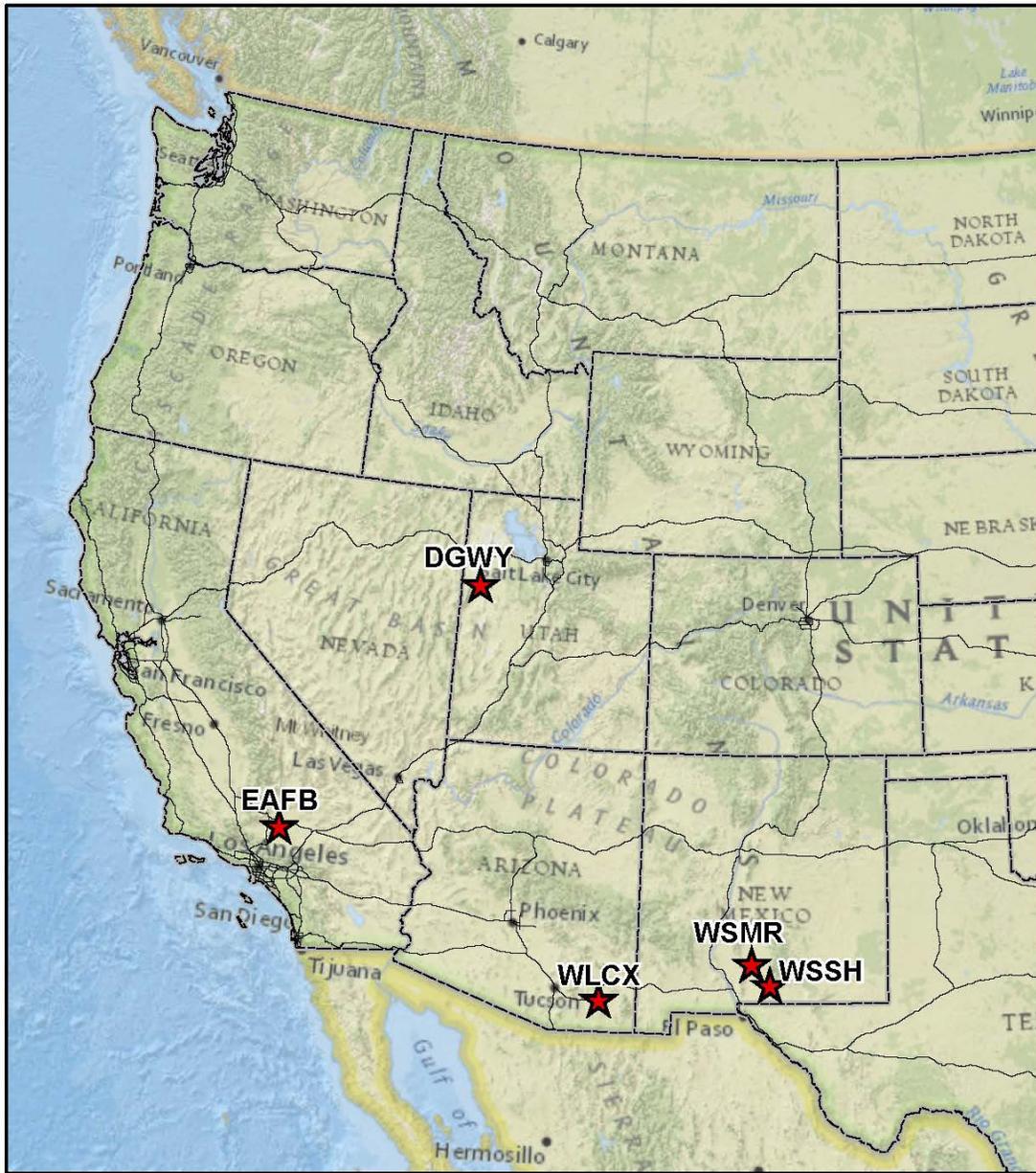
3.3 CONDUCT TEST AT X-4 Pad

The X-4 Pad test area was considered as an alternative for the test landings. It has higher populations of plants and animals. The land surface consists of a mixture of desert shrub and salt flats, which makes it difficult to conduct terrain modification for CST-100 Starliner landing purposes. Additionally the X-4 Pad test area has a permanent cellular tower fixture which poses a hazard for CST-100 Starliner landing operations. Boeing CST-100 Starliner testing should not be conducted at X-4.

3.4 CONDUCT TEST AT URBAN TEST GRID

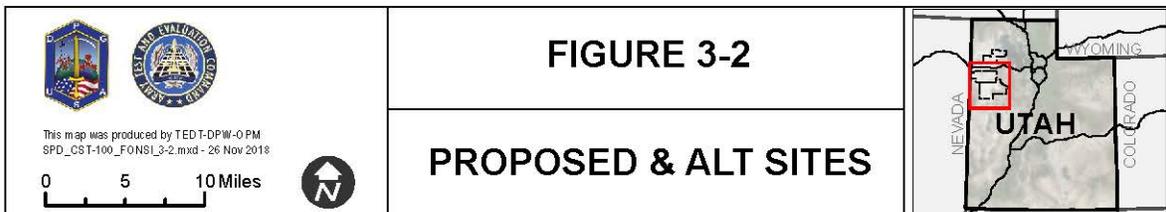
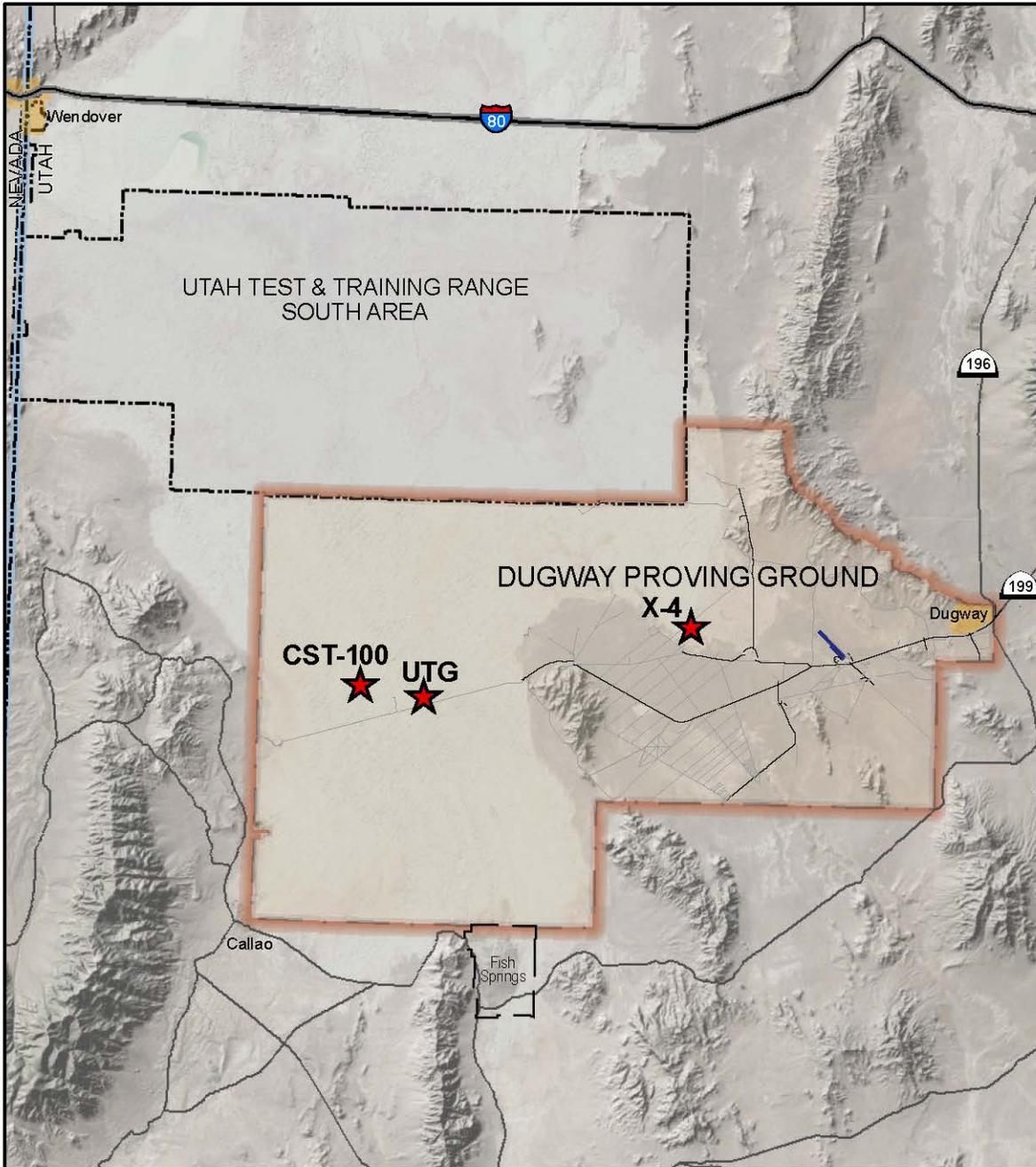
The Urban Test Grid area offers vast flat surfaces with little vegetation. Although this test site would be suitable for the proposed testing, it is already scheduled for another test.

Figure 3-1 Designated Landing Sites



NOTES: DGWY – Dugway Proving Ground; EAFB – Edwards Air Force Base; WLCX – Willcox; WSMR – White Sands Missile Range; WSSH – White Sands Space Harbor.

Figure 3-2 Alternate Sites Considered at DPG



3.5 SELECTION CRITERIA

This section describes the criteria used for comparing the various alternatives including the proposed action, and the application of these criteria to the process of selecting the proposed action (see Table 3-1, below). The selection criteria are as follows:

1. WDTC Director favorable recommendations, supporting commands ability to support, and DPG Command willingness to approve.
2. Meet NASA, FAA, and the Boeing Corporation Requirements:
 - a. Terrain and Climate
 - b. Adequate Test Area
 - c. Staffing
 - d. Infrastructure
 - e. Clean Air Act Title V approval order and permit
 - f. FAA Order 1050.1F
3. Natural and Cultural Resource Concerns:
 - a. Existing access road
 - b. Minimum Flora and Fauna
 - c. United States Fish and Wildlife Service (USFWS) Migratory Bird Take Authorization under Military Readiness
 - d. Current Biological Survey
 - e. Current Cultural Survey and Cultural Resource Compliant
4. Timely and Cost-Effective Use of Funding.

NOTE: The selection criteria, for the Proposed Action, are not to be confused with the significance criteria, which are stated in Chapter 5 for each resource category.

Table 3-1. Alternative Selection Matrix

Selection Criteria/Alternatives	ALT 1 No Action	Proposed Action	ALT 2 X-4 Pad	ALT 3 Urban Test Grid
1. DPG organizations' ability to support and approve.	Yes	Yes	No	No
2. Increase capability to develop CST-100 Starliner objectives.	No	Yes	No	No
3. Meet NASA, FAA, and Boeing Corporation Requirements.				
Terrain and Climate	NA	Yes	No	Yes
Adequate Test Area	NA	Yes	No	No
Staffing	NA	Yes	Yes	Yes
Infrastructure	NA	Yes	No	No
Title V Air Quality Permit	NA	Yes	Yes	Yes
FAA Order 1050.1F	NA	Yes	Yes	Yes
4. Natural and Cultural Resource Concerns.				
Existing access road	NA	Yes	Yes	Yes
Minimum Flora and Fauna	NA	Yes	No	No
Current Biological Survey	NA	Some Areas	Some Areas	Some Areas
Current Cultural Survey for Primary Area	NA	Partial	Yes	Partial
5. Timely and Cost-Effective Use of Funding.	NA	Yes	No	No

CHAPTER 4. AFFECTED ENVIRONMENT

- 4.1** The affected environment is, potentially, approximately 49,683 acres of salt and sand playa in the eight kilometer radius landing site. This area, commonly called “salt flats”, has very sparse vegetation and a limited amount of biological diversity. In the remaining area, of approximately 213,413 acres, there are some ecological communities represented in the outer areas, beyond the salt and sand playa, which include iodine bush (*Allenrolfea occidentalis*), rabbit brush (*Ericameria nauseosa*), black greasewood (*Sarcobatus vermiculatus*) and a limited amount of wildlife. Very little of the landing area, outside of the four kilometer radius, would be affected. The larger area is required because of the jettisoned parts of the spacecraft falling to the earth prior to touch-down. The target landing site is seven miles from the DPG western boundary and 18 miles from Callao, Utah.
- 4.2** The DPG existing environment is described in detail in the *Final Environmental Impact Statement (FEIS) for Activities Associated with Future Programs at U.S. Army Dugway Proving Ground, Utah*, dated November 14, 2004. The existing environment description from this EIS is hereby incorporated by reference to this SEA.
- 4.3** This section presents the affected environment baseline descriptions. DPG is an existing installation with existing operations.
- 4.3.1** DPG’s FEIS baseline activities are those that occurred over the 1996 through 1998 period. During the baseline period, DPG had a total work force generally in the range of 1,100 to 1,200 persons, with the following typical breakdown:
- 5 percent Army military personnel.
 - 40 percent civilians employed by the Army.
 - 40 percent contractors to the Army.
 - 10 percent non-mission related personnel such as personnel of the Postal Service, Tooele County Schools, credit union, etc.
 - 5 percent Air Force (AF) military personnel, contractors, or civilians employed by the AF.
- 4.3.2.** DPG, an MRTFB operated by ATEC, is the US Army's premier materiel testing organization for chemical and biological warfare agent detection, identification, avoidance, protection, and decontamination tactics, techniques, procedures, and equipment. The diverse set of test capabilities operated and maintained by US ATEC’s test center enables the US Army to test military hardware of all types under precise and controlled conditions and across the full spectrum of man-made and natural environments.
- 4.3.3.** DPG is responsible for obtaining and maintaining all applicable environmental permits and approvals to allow test and training operations to take place on the installation. The standard test planning and management process within the WDTC includes an environmental review. In addition, a variety of management plans have been developed, or are under development, at DPG to ensure:
- Compliance with federal and state regulations.
 - Preservation and management of cultural and biological resources.
 - Provision of adequate facilities for DPG personnel and the DPG community.

These management plans enable DPG to effectively support the installation's mission and are intended to mitigate any potential environmental impacts from DPG activities. DPG has also entered into a number of cooperative agreements with other federal, state, and local organizations to allow for mutual support.

- 4.3.4.** Baseline training activities - DPG's remote location and large size enhance its value as an MRTFB range. Access to space is also important as the types of training operations evolve to keep pace with the more sophisticated weapons systems and aircraft that become available.

Conduct of training at DPG is predominantly military, consisting mostly of artillery, air, and ground combat exercises. Military training at DPG occurs in designated locations, including MAAF, training areas, impact areas; maneuver training areas, and targets.

A very small number of training exercises involve non-military organizations such as fire-fighting crews. The following training activities are conducted at DPG:

4.4. Biological Resources

The biological resources of interest include the native and introduced plants and animals on and in the vicinity of the proposed Boeing CST-100 test landing areas.

4.4.1 Federal Laws and Regulations

The following laws are applicable to the Proposed Action and Alternatives for the Boeing CST-100 Test.

- Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d) (Eagle Act)
- Department of Defense Instruction 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual, November 25, 2013
- Endangered Species Act of 1973, as amended (16 U.S.C. §§ 1531-1544) (ESA)
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, 2001 (66 FR 3853)
- Executive Order 130112, Invasive Species, 1999 (64 FR 6183)
- Fish and Wildlife Coordination Act of 1934, as amended (16 U.S.C. §§ 661-666c) (FWCA)
- Migratory Bird Conservation Act of 1929, as amended (16 U.S. C. §§ 715-715s) (MBCA)
- Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-711) (MBTA)

The following law is not applicable to the Federal Government, but DPG aspires to work with the State of Utah to comply with the following Code:

- Utah Administrative Code, Rule R68-9, Utah Noxious Weed Act.

4.4.2 Vegetation

Previous surveys conducted prior to the proposed action identified the proposed Boeing CST-100 test landing areas as almost entirely flat salt and sand playa habitat. The playa is characterized by large contiguous patches of alkaline soil with very low wildlife diversity. Some vegetative/habitat patches occur around the edges of the playa and the project footprints at all sites. The playa covers about 25 percent of DPG acreage (US Army, 2004). The ecological

importance of this community lies in its use by shore birds and migrating waterfowl during the winter and spring months, when standing water covers portions of the playa.

Baseline vegetation surveys have been conducted at the proposed Boeing CST-100 test landing site (US Army, Habitat Survey Report, 2016.). Iodine bush (*Allenrolfea occidentalis*) was the most abundant plant community in the survey area, which is characterized by low plant diversity. This area is characterized by largely non-vegetated areas where the primary ground cover was soil, rock, or litter ranged from 100 percent to 65 percent coverage with an average of 86 percent (US Army, 2014d).

4.4.3 Noxious Weeds and Invasive Species

Executive Order 13112, Invasive Species directs federal agencies to make efforts to prevent the introduction and spread of invasive plant species, which are usually destructive, difficult to control or eradicate, and generally cause ecological and economic harm. Invasive species are those that display rapid growth and spread, becoming established over large areas. Similar to invasive species, noxious weeds are frequently introduced but occasionally are native. A noxious weed is any plant designated by a federal, state or county government as injurious to public health, agriculture, recreation, wildlife, or property. The control of noxious weeds is regulated by the Utah Administrative Code, Rule R68-9.

4.4.4 Wildlife

Playas are composed of barren and sparsely vegetated areas that do not provide suitable habitat for most wildlife species except occasional transients. Species that may be present in the playa are most likely transient and include kit fox, Botta's Pocket Gopher, American badger, coyote, White-tailed Antelope Squirrel, Great Basin Pocket Mouse, Long-tailed Pocket Mouse, Chisel-toothed Kangaroo Rat, Ord's Kangaroo Rat, Western Harvest Mouse, Deer Mouse, Northern Grasshopper Mouse, Common Porcupine, Black-tailed Jackrabbit, Desert cottontail, pronghorn, feral horse, Spade foot Toads, Leopard Lizards, Side-blotched Lizards, Whiptail Lizards, Bull Snakes, Whip snakes, and several dozen species of insects, spiders, and scorpions.

A survey conducted of the Boeing CST-100 UTG test landing area also identified the Great Basin Ground Squirrel (*Urocitellus townsendii*) present in the area. Evidence of burrowing activities of small mammal species, possibly deer mice, have also been noted in the project area (see Figure 4-1).

Figure 4-1 Small Mammal



The alkaline, salt encrusted lake bed and habitat patches are not suitable substrate to support burrowing animals. In field studies in the CST-100 UTG area north of Goodyear Road no burrows have been observed (J. Graham, personal observation). Large mammals such as coyote and badger may occur as transients crossing the lake bed, but would not be considered residents in this area.

4.4.5 Threatened or Endangered Species

The Endangered Species Act of 1973 protects both the species and their associated habitats, and is implemented by the USFWS. The State of Utah also defines threatened or endangered species and species of concern that the UDWR manages in conjunction with DPG if the species occur in the project area. No endangered or threatened species are known to occur, or were identified during natural resource surveys, on the Boeing CST test landing areas.

4.4.6 Migratory Birds

Migratory birds are species that nest in the United States and Canada during the summer and then migrate south to the tropical regions for the non-breeding season. Migratory bird species are managed and protected by the Migratory Bird Treaty Act (MTBA). Executive Order 13186 directs federal agencies to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations and to avoid or minimize adverse impacts on migratory birds through enhanced collaboration with the USFWS. EO 13186 states that emphasis should be placed on species of concern, priority habitats, and key risk factors, and that particular focus should be given to addressing population-level impacts.

Monitoring of migratory species is done in conjunction with the UDWR Partners in Flight Program. Partners in Flight was established in 1990 in response to growing concerns about declines in the populations of many land bird species, and in order to emphasize the conservation of birds not covered by existing conservation initiatives. The Migratory Bird

Conservation Act and the Fish and Wildlife Coordination Act mandate migratory bird habitat conservation, including protection through acquisition, enhancement, and/or management to avoid and minimize adverse impacts.

On July 31, 2006, the DoD and the USFWS entered into a Memorandum of Understanding (MOU) to Promote the Conservation of Migratory Birds, in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." This MOU describes specific actions that should be taken by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations-other than military readiness activities-are consistent with the Migratory Bird Treaty Act. This MOU does not waive legal requirements under the MBTA, Bald and Golden Eagle Protection Act, ESA, or any other statutes and does not authorize the take of migratory birds.

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act. Bald eagles forage for food primarily over open waters. No suitable habitat (open water) where bald eagles would most likely be present is located in the test landing area during the summer months. Golden eagle nests have been mapped by DPG as shown in Figure 4-2. No eagle nests are located within the proposed footprint of the test site; the closest golden eagle nests are 12 miles or more from the UTG test landing site and 3 miles or more from the X-4 FP test landing site. DPG, Hill Air Force Base, and local conservation partners have tagged and tracked the movement of Golden Eagles on the UTTR and have concluded that golden eagle usage of the playa is minimal.

Sensitive avian species are generally absent from the Boeing CST test landing areas with the possible exception of the Snowy Plover. The Snowy Plover, although very unlikely to be found near the UTG site, could occur in the general vicinity if there are any ephemeral ponds in the playa habitat created by summer thunderstorms during any scheduled test landing. These birds already occupy similar habitat associated with non-vegetated perennial ponds on the mud flats adjacent to the Great Salt Lake. However, the short-lived, ephemeral ponds formed by localized thunderstorms are most likely to provide a temporary resting area for transient migratory bird species flying through test landing areas.

Potential nesting of migratory bird species within and nearby the Boeing CST test landing sites spans the months of March through the end of July for the majority of the local nesting species. Spring migration period is February through May for most species and fall migration period is late July through November for most species. Golden eagles and great horned owls are both early nesters and will begin nesting in February. Eared grebe migration is generally food dependent, and so fall migration often varies widely and may occur into late winter.

Table 4-1 shows bird species of special concern listed from Utah Division of Wildlife Resources (UDWR) Species of Concern (SPC) for Tooele County, USFWS Birds of Conservation Concern (USFWS BCC), BLM Species of Concern and Utah Partners in Flight (PIF) Priority Species. Additional avian species that are likely to be encountered in the project area are described in Table H-1 of the Avoid and Minimize Plan (see Appendix H). All other bird species known to occur on DPG are listed in the DPG Integrated Natural Resource Management Plan (2014).

4.5 Cultural Resources

Previous cultural resource surveys on the playa have revealed a total of 122 archaeological sites. These sites are an eclectic mix ranging from PaleoIndian-age archaeological sites (about 12,000 years old) to the Lincoln Highway (1919 AD). Most of these sites, 50, have been

determined to be eligible for the National Register of Historic Places (NRHP), while 15 have been determined not to meet the eligibility criteria of the NRHP, and 24 are of undetermined status. Many more archaeological sites are estimated to be present in the mudflats surrounding the UTG.

The primary archaeological site type located on the mudflats are PaleoIndian-age lithic scatters. These are generally surface archaeological sites, but the potential for significant subsurface and organic material is possible as evidenced by the nearby Wish Bone archaeological site on the Utah Test and Training Range (UTTR) South Range which revealed a 12,300 year old hearth and evidence of the first use of tobacco in the Western Hemisphere.

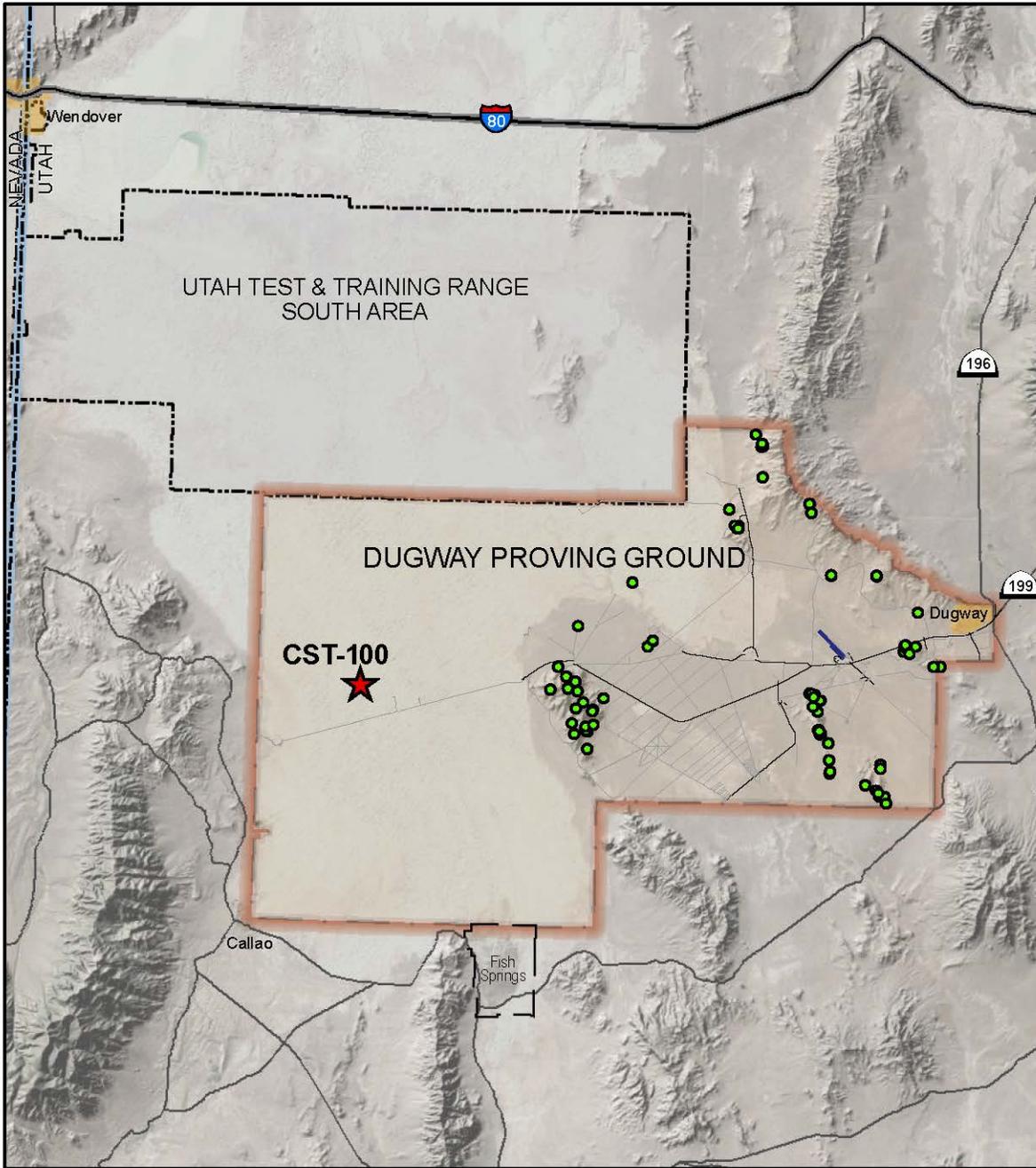
Historic resources are also present and include two linear sites: the NRHP-Eligible Lincoln Highway and an unrecorded trail dating to the early twentieth century and possibly associated with bootlegging on Granite Mountain.

The area does not contain any previously identified sacred sites.

For more analyzed, published, and valid information:

- Contact the DPG Public Affairs Officer, telephone (435) 831-2116 or (435) 831-3409, may be contacted to obtain a copy of the “existing environment” description, which is contained in the above referenced EIS.
- In addition, the EIS is on file in several area libraries and may be reviewed at the University of Utah Marriott Library, 295 South 1500 East, Salt Lake City, Utah; the Tooele Public Library, 128 West Vine, Tooele, Utah; the Dugway Community Library, 2243 Kister Avenue, Dugway, Utah; and the Salt Lake County Whitmore Library, 2197 East Fort Union Boulevard, Salt Lake City, Utah.

Figure 4-2 Golden Eagle Nest Locations



 <p>This map was produced by TED T-DPW-0 PM SPD_CST-100_FONSI_4-2.mxd - 26 Nov 2018</p> <p>0 5 10 Miles</p> 	<p>FIGURE 4-2</p> <p>GOLDEN EAGLE NESTS</p>	
--	---	---

Table 4-1 Sensitive Bird Species of Concern List

Common Name	Scientific Name	Status	Habitat Present within Test landing Area	Confirmed Breeding in Tooele County
State Species of Concern Known to Occur on DPG Lands				
American White Pelican	<i>Pelecanus erythrorhynchos</i>	Utah Division of Wildlife Resources (UDWR) SPC, BLM SPC, UPIF. Transient spring/fall, flies above 500 feet.	No	No
Bald Eagle	<i>Haliaeetus leucocephalus</i>	USFWS BCC, UDWR SPC, BLM SPC. Winter transient.	No	No
Burrowing Owl	<i>Athene cunicularia</i>	UDWR SPC, BLM SPC, DPG SCC. Resident spring/fall.	No	Yes
Ferruginous Hawk	<i>Buteo regalis</i>	USFWS BCC, UDWR SPC, BLM SPC, UPIF. Resident.	No	Yes
Long-Billed Curlew	<i>Numenius americanus</i>	USFWS BCC, UDWR SPC, BLM SPC, UPIF. Resident spring/fall.	No	Yes
Short-Eared Owl	<i>Asio flammeus</i>	UDWR SPC, BLM SPC. Resident spring/fall.	No	Yes
Additional “Birds of Conservation Concern” (BCC) Listed by UDWR, UPIF, USFWS or Bureau of Land Management (BLM) and Known to Occur on DPG Lands				
American Avocet	<i>Recurvirostra Americana</i>	UPIF. Transient spring/fall; uses sewage lagoons.	No	Yes
Black-Necked Stilt	<i>Himantopus mexicanus</i>	UPIF. Transient spring, uses sewage lagoons.	No	Yes
Black Rosy-Finch	<i>Leucocephalus atrata</i>	USFWS BCC, UPIF. Vagrant winter.	No	No
Black-Throated Gray Warbler	<i>Dendroica nigrescens</i>	UPIF. Resident spring/fall.	No	No
Bobolink*	<i>Dolichonyx oryzivorus</i>	UDWR SPC, BLM SPC, UPIF. Vagrant spring/fall.	No	No
Brewer’s Sparrow	<i>Spizella breweri</i>	USFWS BCC, UPIF. Resident spring/fall.	No	Yes
Broad-Tailed Hummingbird	<i>Selasphorus platycercus</i>	UPIF. Resident spring/fall.	No	No
Eared Grebe	<i>Podiceps nigricollis</i>	USFWS BCC. Transient; uses sewage lagoons.	No	Yes
Golden Eagle	<i>Aquila chrysaetos</i>	USFWS BCC, DPG SCC. Resident; 5 known nesting pairs on DPG. Closest Golden Eagle nest to the test site is 12 miles, 17 miles, other nests are more than 25 miles.	No	Yes

Common Name	Scientific Name	Status	Habitat Present within Test landing Area	Confirmed Breeding in Tooele County
Grasshopper Sparrow*	<i>Ammodramus savaanarum</i>	UDWR SPC. Transient.	No	No
Gray Vireo	<i>Vireo vivinoir</i>	UPIF.	No	No
Greater Sage-grouse*	<i>Centrocercus urophasianus</i>	USFWS C, UDWR C, BLM C, DPG SCC. Transient.	No	Yes
Green-tailed Towhee	<i>Pipilo chlorurus</i>	USFWS BCC. Resident spring/fall.	No	Yes
Lewis's Woodpecker	<i>Melanerpes lewis</i>	USFWS BCC, UDWR SPC, BLM SPC, UPIF. Transient summer.	No	No
Loggerhead Shrike	<i>Lanius ludovicianus</i>	USFWS BCC. Resident.	No	Yes
Marbled Godwit	<i>Limosa fedoa</i>	USFWS BCC. Transient spring/fall.	No	No
Northern Goshawk	<i>Accipiter gentilis</i>	UDWR CS, BLM SPC. Transient.	No	No
Peregrine Falcon	<i>Falco peregrinus</i>	USFWS BCC. Resident. Two breeding pairs located during 2014 surveys.	No	Yes
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	USFWS BCC, UPIF. Resident.	No	Yes
Sage Sparrow	<i>Amphispiza nevadescens</i>	USFWS BCC, UPIF.	No	Yes
Sage Thrasher	<i>Oreoscoptes montanus</i>	USFWS BCC. Resident spring/fall	No	Yes
Snowy Plover	<i>Charadrius alexandrinus</i>	USFWS BCC, DPG SCC. Resident in spring/fall.	Possible	Yes
Virginia's Warbler	<i>Vermivora virginiae</i>	USFWS BCC. Transient spring/fall.	No	No
Willow Flycatcher	<i>Empidonax traillii</i>	USFWS BCC. Transient spring/fall.	No	No

Source: US Army, 2014 (INRMP)

BCC	Birds of Conservation Concern
C	Candidate for Listing
P	Partners in Flight Priority Species
SPC	Wildlife Species of Concern
SCC	Species of Conservation Concern
UPIF	Utah Partners in Flight
CS	Conservation Species, Species receiving special management under a conservation agreement in order to preclude the need for federal listing

* - Indicates potential but currently not known to occur on DPG

CHAPTER 5. ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

This chapter is organized by resource categories, with an analysis of the potential impacts of the proposed action and alternatives according to the significance criteria listed for each resource category. This chapter also assesses the effects (direct, indirect, and cumulative of the Proposed Action and its alternatives on the environment) and what practical mitigation is available to minimize these impacts. Direct and indirect effects are stated in the individual environmental resource analysis. Indirect effects are also discussed at the end of the chapter, as are cumulative effects.

FAA Order 1050.1F provides resource categories that the FAA must consider in its NEPA reviews. Because the FAA plans to adopt this SEA to support its environmental review of Boeing's license application, the FAA's resource categories listed in FAA Order 1050.1F are addressed in this SEA. FAA Order 1050.1F, Paragraph 4-1, lists the FAA's resource categories. The following FAA resource categories are dismissed from detailed review in the SEA for the reasons stated below:

- **Coastal Resources** – Starliner reentry and landing would occur at DPG, which is not located near coastal resources. The sonic boom generated during Starliner reentry would not impact coastal resources.
- **Farmlands** – No farmlands would be affected by Starliner reentry and landing at DPG because there are no farmlands located at the landing site.
- **Natural Resources** – the FAA is required to consider the potential impacts on “natural resources and energy supply.” Energy supply is discussed in this SEA. In the context of FAA's NEPA impact assessment, the FAA must consider the amount of natural resources—such as water, asphalt, aggregate, and wood—a project would use in the construction, operation, and maintenance of a project. The proposed action would not result in the development of new facilities or result in consumption of natural resources.
- **Children's Environmental Health and Safety** – No children would be present near the landing site during Starliner reentry. The proposed action does not have the potential to lead to a disproportionate health or safety risk to children.
- **Wild and Scenic Rivers** – there are no wild and scenic rivers located at or near the landing site at DPG.

Significantly as used in NEPA requires considerations of both context and intensity (32 CFR 651.5, 651.39, and Appendix C and 40 CFR 1508.27):

(a) *Context*. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. The Army NEPA regulation, 32 CFR 651, states at 651.5(b) that “[d]ecision makers will be cognizant of the impacts of their decisions on cultural resources, soils, forests, rangelands, water and air quality, fish and wildlife, and other natural resources under their stewardship, and, as appropriate, in the context of regional ecosystems.” This environmental assessment discusses the context of the

proposed action and alternatives, but see especially page 10, chapter 4 (pages 20-27), and Appendix E (pages 72-78).

(b) *Intensity*. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. The beneficial impacts are intended to include advances in human space travel, enhanced safety for space travelers, development of new technology, and economical benefits, to include creation of new jobs.

(2) The degree to which the proposed action affects public health or safety. The intensity of the release point is not anticipated to have an intense effect on public health or safety, because the public will not be within seven miles of the CST-100 test landings. See the Figure 2-3. So the intensity for this factor is non-existent.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. It is anticipated that no cultural resources affected by the test landing. See the analysis in Figure 3-1 and Section 5.8. There are not park lands or farmlands on DPG. There are not any wetlands that are “waters of the US” on DPG, including wild and scenic rivers. There are not any ecologically critical areas near the proposed test landing site. So “intensity” of the proposed action near the test landing site is extremely low.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial. The effects on the quality of the human environment at the test landing location are not likely to be highly controversial, because the proposed action is in areas occupied by humans only for the conduct of NASA contractor testing. As such, the intensity for this aspect is likely to be low, as interested parties are informed of all of the facts, including the prior NASA testing, without illness, or injury, and without the loss of wildlife. See the facts and analysis of the Affected Environment in chapter 4.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. The possible effects are well known because of prior NASA testing. The intensity of this factor is low because of prior documented history and the absence of the public and the presence of only experienced testers at a safe distance.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. This type of NASA and Boeing Corporation testing could be repeated. This type of testing has no significant impact to the environment. So the precedence factor is of low to moderate intensity.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. The proposed action and alternatives are unlikely to have a cumulatively significant impact for the reason that test landings would be conducted in an area of environmental non-significance.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources. Section 106 consultation will be completed.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. The proposed action and alternatives are unlikely to have intensity – for endangered or threatened species. See page 10, chapter 4 (pages 20-27), and appendix C (pages 72-78).

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. This Proposed Action and alternatives are designed to comply with Federal, State, and local law, so this factor is anticipated to have a low intensity. See the discussion of the air resource at Table 3-1 (page 17), Section 5.3.

In addition, the FAA uses thresholds that serve as specific indicators of significant impact for some resource categories (FAA Order 1050.1F, Paragraph 4-3.3). FAA actions that would result in impacts at or above these thresholds require the preparation of an EIS, unless impacts can be reduced below threshold levels. Quantitative significance thresholds do not exist for all resource categories; for those resource categories analyzed in this SEA, the FAA's significance threshold is provided, as applicable.

5.1 Geology and Soils

This section analyzes the potential impacts of the Proposed Action and alternatives to geology and soils at DPG. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.1.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to geology and soils from the Proposed Action or alternatives would be considered significant if they were to:

- ◆ Cause significant soil erosion or compaction, such that biotic communities are seriously threatened.
- ◆ Significantly affect the future ability to use geologic resources.
- ◆ Cause damage to unique geologic features.

5.1.2 Impacts of the Proposed Action

The proposed action involves limited use of off-road vehicles on existing terrain. Access to the test landing area would use existing maintained roads. Using existing terrain, with its geologic and soil features, some vegetation would be altered or removed. Test preparation, wildlife biologist mitigation, and monitoring activities would be conducted with ATVs on the playa, which is not anticipated to significantly impact the geology and soils of the affected environment of the test landing area. ATV use would be limited to a network of defined and well-marked routes. Recovery of the capsule would impact the soil, but not significantly.

5.1.3 Impacts of the Alternatives

The No Action alternative would maintain the present state of geology and soils of DPG, barring a man-made or natural disaster.

Conducting the test landings at the alternate sites at X-4 Pad and the Urban Test Grid would not significantly affect the geology and soils of those areas and would not result in significant impact to the environment. The geology and soils of these sites do not significantly differ.

Alternate site test landing preparation and conduct would not cause significant soil erosion or compaction such that biotic communities are seriously threatened.

Alternate site test preparation and conduct would not significantly affect the future ability to use geologic resources.

Alternate site test preparation and conduct would not cause damage to unique geologic features.

5.2 Water

This section analyzes the potential impacts of the Proposed Action and alternatives to surface water (including wetlands) and groundwater at DPG. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.2.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to water resources from the Proposed Action or alternatives would be considered significant if they were to:

- ◆ Significantly alter surface flow conditions, patterns, or rates where facilities would discharge to “waters of the United States” or a scenario causing wetlands to dry up.
- ◆ Cause large flooding or siltation.
- ◆ Significantly degrade surface water quality with regard to biota either directly or indirectly as a result of bio-concentration or bio-accumulation.
- ◆ Largely decrease availability of surface water to wildlife.
- ◆ Largely increase the potential to adversely affect groundwater quality.
- ◆ Cause noncompliance with applicable water quality standards.
- ◆ Significantly lower an aquifer’s water table or potentiometric surface such that aquifer depletion would be a concern.
- ◆ Significantly alter groundwater recharge to an aquifer.

Also, according to FAA Order 1050.1F, water resource impacts would be considered significant if the Proposed Action would: (1) exceed water quality standards established by federal, state, local, and tribal regulatory agencies; (2) contaminate public drinking water supply such that public health may be adversely affected; (3) exceed groundwater quality standards established by federal, state, local, and tribal regulatory agencies; (4) contaminate an aquifer used for public water supply such that public health may be adversely affected; (5) adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers; (6) substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected; (7) substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public); (8) adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands; (9) promote development of secondary activities or services that would cause the circumstances listed above to occur; (10) be inconsistent with applicable state wetland strategies; or (11) cause notable adverse impacts on natural and beneficial floodplain values.

5.2.2 Impacts of the Proposed Action

There is very little surface water at DPG and surface water is rarely found within the area of the Proposed Action. If surface water is present, then measures will be taken to limit test landing activities.

The Proposed Action would not significantly alter surface flow conditions, patterns, or rates where facilities would discharge to "waters of the State" or cause wetlands to dry up.

The Proposed Action would not cause large flooding or siltation.

The Proposed Action would not significantly degrade surface water quality with regard to biota either directly or indirectly as a result of bio-concentration or bio-accumulation.

The Proposed Action would not largely decrease availability of surface water to wildlife.

The Proposed Action would not largely increase the potential to adversely affect groundwater quality.

The Proposed Action would not cause noncompliance with applicable water quality standards.

The Proposed Action would not significantly lower an aquifer's water table or potentiometric surface such that aquifer depletion would be a concern.

The Proposed Action would not significantly alter groundwater recharge to an aquifer.

The proposed action would not negatively impact the water resources of DPG or the surrounding area. The proposed action would not significantly increase the use of potable or non-potable water on DPG.

5.2.3 Impacts of the Alternatives

The No Action alternative would maintain the present water resource conditions of DPG, barring a man-made or natural disaster.

Conducting the test landings at the alternate sites at X-4 Pad and the Urban Test Grid would not significantly affect the water resources of those areas and would not result in significant impact to the environment.

Testing at the alternate sites would not substantially alter surface flow conditions, patterns, or rates where facilities would discharge to “waters of the State” or cause wetlands to dry up.

Testing at the alternate sites would not cause substantial flooding or siltation.

Testing at the alternate sites would not substantially degrade surface water quality with regard to biota either directly or indirectly as a result of bio-concentration or bio-accumulation.

Testing at the alternate sites would not substantially decrease availability of surface water to wildlife.

Testing at the alternate sites would not substantially increase the potential to adversely affect groundwater quality.

Testing at the alternate sites would not cause noncompliance with applicable water quality standards.

Testing at the alternate sites would not substantially lower an aquifer’s water table or potentiometric surface such that aquifer depletion would be a concern.

Testing at the alternate sites would not substantially alter groundwater recharge to an aquifer.

Testing at the alternative sites would not negatively impact the water resources of DPG or the surrounding area. Testing at the alternative sites would not significantly increase the use of potable or non-potable water on DPG.

5.3 Air Quality

This section analyzes the potential impacts of the Proposed Action and alternatives to air quality at DPG. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.3.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to air quality from the Proposed Action or alternatives would be considered significant if they would:

- Any air release or emission that exceeds permit conditions as set forth by the Utah Department of Environmental Quality (UDEQ) Division of Air Quality (DAQ).

- Cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS) or would increase the frequency or severity of any such existing violations (FAA Order 1050.1F).

5.3.2 Impacts of the Proposed Action

DPG currently operates under a Clean Air Act (CAA) Title V Operating Permit issued by the Utah Department of Air Quality (UDAQ), valid until February 6, 2022. The Title V Operating Permit consolidates all air quality regulatory requirements in a single document, so a permit holder can clearly determine compliance with the air quality environmental laws governing its operation. Any stationary source of air pollutants which emits, or has the potential to emit (i.e., the maximum emissions that equipment can produce under permit limitations and operational capacity), 100 tons per year (TPY) or more of any pollutant regulated under the CAA is a major stationary source. There are six criteria pollutants listed under the CAA NAAQS; Ground-Level Ozone (O₃), Carbon Monoxide (CO), Sulfur Dioxide (SO₂), Particulate Matter (PM), Lead (Pb), and Nitrogen Dioxide (NO₂). Based on its potential to emit, DPG is designated a major stationary source for NO₂, one of the six listed criteria pollutants. DPG is considered an area source for Hazardous Air Pollutants (HAPs) under the CAA National Emissions Standards for Hazardous Air Pollutants (NESHAPs) in which emissions of HAPs as well as the potential to emit HAPs is below 10 TPY for a single HAP and below 25 TPY for any combination of HAPs. Therefore, the installation is alert to prevention of significant amounts of pollutants. The requirements of 40 CFR Protection of Environment Sec. 52.21 and Utah Administrative Code R307-405 Prevention of Significant Deterioration would be met to prevent significant impacts.

5.3.3 Impacts of the Alternatives

The No Action alternative would not require an additional Air Quality permit or amendment of the present DPG operating Air Quality permit.

The proposed action and other area alternative involve an amount of a HAP propellant release to the environment. The total amount of additional HAP air release due to propellant use is insignificant to the threshold limit allowed (the limit is 10 tons and the proposed HAP release to the environment is 50 pounds). Neither the proposed action nor the other area alternative is anticipated to significantly impact the air quality of DPG or the surrounding area.

5.4 Biological Resources

This section analyzes the potential impacts of the Proposed Action and alternatives to biological resources at DPG. The criteria used to evaluate whether these potential impacts are considered significant and mitigation measures that could be implemented to reduce any adverse impacts are presented.

5.4.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to biological resources from the Proposed Action or alternatives would be considered significant if:

- The viability of a federally protected species is jeopardized or the action would result in the need to list a species under the Endangered Species Act (ESA) or state regulation.

- Habitat necessary for all or part of a species' life cycle, for example, nesting grounds, fawning areas, migration corridors, or watering areas, is degraded.
- Sensitive, threatened, or endangered species are adversely affected.
- Unique habitats are lost or severely reduced.
- A local or regional species is lost.
- Ecological processes and functions are damaged to the extent that the ecosystem is no longer sustainable or biodiversity is impaired.
- Damaging range fires or exotic annual species would increase.
- The US Fish and Wildlife Service determines the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species, or would result in the destruction or adverse modification of federally designated critical habitat (FAA Order 1050.1F).

5.4.2 Impacts of the Proposed Action

Biological resource impacts are evaluated with these significance criteria for the Proposed Action.

5.4.2.1 Impacts to Vegetation

Baseline surveys conducted previously on the playa have determined that there is very little vegetative cover and a low biodiversity within vegetated areas on the playa. The dominant species (and in most cases within the proposed impact area, the only species) on the playa is iodine bush (*Allenrolfea occidentalis*). This habitat is not of high value for wildlife use and is not unique to the proposed test landing area. There are large expanses of similar playa habitat surrounding the proposed test landing location; therefore, impacts from ground modification to vegetation on the test grid would not be significant.

5.4.2.2 Impacts to Wildlife

There is an extremely low incidence of usage of the playa habitat by larger wildlife species such as kit fox, coyote, badger, and pronghorn. During the surveys conducted in 2014, we found a couple of sets of pronghorn tracks, indicating presence at some point in the previous months. Most usage is likely from individuals moving across the playa to get from one suitable habitat patch to another. Smaller wildlife species, such as ground squirrels, pocket gophers, deer mice, and other rodents, may also potentially be present within the proposed test landing area. However, the low plant diversity, cover, high water table and seasonal ponding of water across the playa are not conducive for rodent burrows. There could be impacts to wildlife present in the test landing area if they come in direct contact with the CST-100 during the test landings. However, the likelihood of that occurring are de minimus. Based on these observations and conclusions, we predict that the test landings would not significantly impact the wildlife populations at DPG.

Threatened, Endangered Species

No threatened or endangered plant or animal species have been identified on DPG or in the Boeing CST-100 test landing area; therefore, no impacts would occur. Certain species of tiger beetles are often endemic within small areas specifically where other wildlife is scarce; however, no new species of tiger beetles have been documented on the playa and only the Coral Pink Sand Dune tiger beetle is protected in Utah, and is not known to occur in the Boeing CST-100 test landing area. Therefore, based on there being no threatened or endangered species, or their habitat, within the proposed action area, we have determined the proposed action will have no effect on ESA-listed species.

Migratory and Resident Bird Populations

Baseline avian population surveys were conducted in 2014 in preparation for a separate NEPA proposed action. Twelve of these surveys were located within the proposed test landing area, and the rest were spread across the surrounding playa. These surveys, conducted over several months between summer and fall of 2014, produced observations of only four avian species represented by 45 total individuals. Within the proposed test landing location, the number of bird sightings was much lower, and Horned Lark was the only species documented. The survey results support the conclusion that the playa habitat is low in biodiversity, and does not provide food or shelter in quantities necessary to support significant avian populations.

As discussed in Chapter 4 and supported by the 2014 baseline surveys, sensitive avian species have not been documented in the Boeing CST-100 test landing area. Of the birds of special concern (Table 4-1) that could potentially occur on DPG, Snowy Plover could potentially occur if ponded water is present in the test landing area. The probability of ponded water and the Snowy Plover being present during a test landing is very low. If ponded water is present on the playa immediately prior to test landing operations commencing, surveys will be conducted to determine if any species of concern are present, and if so, appropriate avoid and minimize measures will be taken to deter birds from those areas.

Bird aircraft strike hazard (BASH) has been considered as part of the proposed action. A potential exists for activities to occur during the breeding season of migratory birds. A qualified biologist shall conduct nest surveys immediately prior to recovery efforts and will advise of potential nesting concerns. At this point, based on baseline survey results and the low habitat diversity of the proposed area of impact, nesting birds are not anticipated to be present in the test landing area.

After reviewing the launch and recovery schedules, and with the infrequent timing of the events and the speed of descent of the CST-100, we conclude that BASH probabilities are de minimus and will not present a significant impact to the migratory bird population.

Based on the Golden Eagle monitoring data previously discussed in Chapter 4, and the low habitat availability within the CST-100 test landing area, it is unlikely Bald or Golden Eagles will occur within the test landing area; therefore no significant impacts are expected on Bald and Golden Eagle populations at DPG.

Based on the baseline surveys and the data discussed, we conclude the following in regards to the CST-100 potential wildlife impacts:

- The Proposed Action would not jeopardize the viability of a federally protected species nor result in the need to list a species under the Endangered Species Act (ESA) or state regulation.
- The Proposed Action would not degrade habitat necessary for all or part of a species' life cycle, for example, nesting grounds, fawning areas, migration corridors, or watering areas.
- The Proposed Action would not affect sensitive, threatened, or endangered species.
- The Proposed Action would not cause unique habitats to be lost or severely reduced.
- The Proposed Action would not cause a local or regional species to be lost.
- The Proposed Action would not cause ecological processes and functions to be damaged to the extent that the ecosystem is no longer sustainable or biodiversity is impaired.
- The Proposed Action would not increase or contribute to the increase in damaging range fires or the spread of exotic annuals.
- The Proposed Action would be conducted in accordance with Department of Defense Instruction 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual, November 25, 2013.

5.4.3 Impacts of the Alternatives

The No Action alternative would maintain the present vegetation levels and the present wildlife levels or cycles at DPG, barring a man-made or natural disaster.

In contrast to the test landing site in the Proposed Action, the alternate sites have significantly more vegetation and wildlife and would require more modification to meet requirements of the proposed action. The loss of this vegetation could significantly impact wildlife populations in those areas. The following can be concluded about testing at the alternate proposed test landing locations:

- Testing at the alternate sites would not cause unique habitats to be lost or severely reduced.
- Testing at the alternate sites would not cause a local or regional species to be lost.
- Testing at the alternate sites would not cause ecological processes and functions to be damaged to the extent that the ecosystem is no longer sustainable or biodiversity is impaired.
- Testing at the alternate sites could increase contributions to unwanted or unnatural trends, such as fire or exotic annuals.

5.5 Socio-Economic Conditions

This section analyzes the potential impacts of the Proposed Action and alternatives to socio-economic conditions at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.5.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to socio-economic conditions from the Proposed Action or alternatives would be considered significant if:

- ◆ There are substantial gains or losses in population and/or employment.
- ◆ There is disequilibrium in the housing market such as severe housing shortages or surpluses resulting in substantial property value changes.
- ◆ Project-related demands on public infrastructure or services trigger the need for expanded capacity or result in discernible reductions in the level of service provided.
- ◆ Activities or operational aspects substantially altering lifestyles or quality-of-life of DPG employees, their families, and civilian households living near DPG.

5.5.2 Impacts of the Proposed Action

It is anticipated that there would be more than 100 test participants coming to DPG in 2018. Demand for lodging, food, and after work activities would produce a measurable positive impact to the socio-economic conditions of DPG and the surrounding area during test periods.

The Proposed Action would not cause substantial gains or losses in population and/or employment.

The Proposed Action would not cause disequilibrium in the housing market such as severe housing shortages or surpluses resulting in substantial property value changes.

The Proposed Action would not cause project-related demands on public infrastructure or services triggering the need for expanded capacity or result in discernible reductions in the level of service provided.

The Proposed Action activities or operational aspects would not substantially alter lifestyles or quality-of-life of DPG employees, their families, and civilian households living near DPG.

5.5.3 Impacts of the Alternatives

The No Action alternative would not increase favorable socio-economic conditions in the form of increased demand for lodging, restaurants, and off-hours activities.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would produce a measurable positive impact to the socio-economic conditions of DPG and the surrounding area

during test periods, in that approximately the same increase in demand for lodging, restaurants, and after work activities would be experienced.

Testing at the alternate test sites would not cause substantial gains or losses in population and/or employment.

Testing at the alternate test sites would not cause disequilibrium in the housing market such as severe housing shortages or surpluses resulting in substantial property value changes.

Testing at the alternate test sites would not cause project-related demands on public infrastructure or services triggering the need for expanded capacity or result in discernible reductions in the level of service provided.

Alternate test landing site activities or operational aspects would not substantially alter lifestyles or quality-of-life of DPG employees, their families, and civilian households living near DPG.

5.6 Environmental Justice

This section analyzes the potential impacts of the Proposed Action and alternatives to environmental justice projected to occur to off-installation populations. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.6.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to environmental justice from the Proposed Action or alternatives would be considered significant if:

- ◆ Potential environmental justice impacts would be judged as significant if the Proposed Action or alternatives were to cause a disproportionately high and adverse impact to identified minority or low-income populations.
- ◆ Disproportionately high and adverse environmental or human health impacts would be considered to occur if there would be substantial impacts affecting a minority or low-income population which appreciably exceed those of the general population in and around DPG.

5.6.2 Impacts of the Proposed Action

There are no identifiable impacts projected to occur to off-installation populations as a direct or indirect result of the Proposed Action. Environmental or health impacts from the Proposed Action would not be localized or placed primarily on minority and/or low-income population components.

The Proposed Action would not cause a disproportionately high and adverse impact to minority or low-income populations

The Proposed Action would not cause substantial impacts affecting a minority or low-income population which appreciably exceed those of the general population in and around DPG.

5.6.3 Impacts of the Alternatives

The No Action alternative would maintain the status quo concerning minority and/or low-income population components.

There are no identifiable impacts projected to occur to off-installation populations as a direct or indirect result of testing at the alternate sites at X-4 Pad and the Urban Test Grid. Environmental or health impacts from testing at the alternate sites at X-4 Pad and the Urban Test Grid would not be localized or placed primarily on minority and/or low-income population components.

Testing at the alternative sites would not cause a disproportionately high and adverse impact to minority or low-income populations.

Testing at the alternate sites would not cause substantial impacts affecting a minority or low-income population which appreciably exceed those of the general population in and around DPG.

5.7 Land Use

This section analyzes the potential impacts of the Proposed Action and alternatives to land use at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.7.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to land use from the Proposed Action or alternatives would be considered significant if they were to:

- ◆ Cause major changes in established land uses.
- ◆ Cause considerable land ownership changes.
- ◆ Largely reduce or degrade the quality of land.
- ◆ Result in loss of important or unique land resources or features.
- ◆ Cause large changes in access to DPG and its facilities.
- ◆ Large conflict with adopted local or regional land use plans.

5.7.2 Impacts of the Proposed Action

The land areas dedicated for the use of testing and TTPs are not used for any known agricultural pursuit. It is not expected that land use patterns would be impacted. It is anticipated that the proposed action would not significantly impact land use on DPG.

The Proposed Action would not cause substantial changes in established land uses.

The Proposed Action would not cause considerable land ownership changes.

The Proposed Action would not substantially reduce or degrade the quality of land.

The Proposed Action would not result in loss of important or unique land resources or features.

The Proposed Action would not cause large changes in access to DPG and its facilities.

The Proposed Action would not conflict with adopted local or regional land use plans.

5.7.3 Impacts of the Alternatives

The No Action alternative would not impact land use.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not impact land use.

Testing at alternative sites would not cause substantial changes in established Land uses.

Testing at alternative sites would not cause considerable land ownership changes.

Testing at alternative sites would not substantially reduce or degrade the quality of land.

Testing at alternative sites would not result in loss of important or unique land resources or features.

Testing at alternative sites would not cause substantial changes in access to DPG and its facilities.

Testing at alternative sites would not conflict with adopted local or regional land use plans.

5.8 Cultural Resources

This section analyzes the potential impacts of the Proposed Action and alternatives to cultural resources at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.8.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to cultural resources from the Proposed Action or alternatives would be considered significant if they were to:

- ◆ Cause a large disturbance to or adversely affect unsurveyed cultural resource sites.
- ◆ Adversely affect NRHP-eligible resources.
- ◆ Disturb or adversely affect sacred Native American sites.
- ◆ Cause considerable changes in access to cultural resources.

- ◆ Result in noncompliance with cultural resource regulations

5.8.2 Impacts of the Proposed Action

All vehicular traffic, personnel movement, construction, and testing would be coordinated with the cultural resource office and would pose less than significant impact to cultural resources. Previous drop test landings of the Boeing CST have demonstrated that the landing of this spacecraft will be very low impact with no creation of a crater. In addition, the recovery vehicles will be limited in scope and will utilize an existing trail to the center of the landing zone and any deviation from that trail will require the aid of an archaeological monitor to avoid adverse effects to archaeological sites. The Utah State Historic Preservation Officer (SHPO) has concurred with a No Adverse Effect determination for the effect of this undertaking on NRHP eligible cultural resources.

If subsurface cultural remains or artifacts are inadvertently uncovered, operations would stop in the immediate vicinity, and the DPG Cultural Resources office would immediately be notified. A DPG archaeologist would immediately investigate the discovery. The appropriate Tribes and the SHPO would then be consulted.

The Proposed Action would not adversely affect NRHP-eligible resources.

The Proposed Action would not disturb or adversely affect sacred Native American sites.

The Proposed Action would not cause considerable changes in access to cultural resources.

The Proposed Action would not result in noncompliance with cultural resource regulations.

The proposed action is not anticipated to have a significant adverse impact on cultural resources.

5.8.3 Impacts of the Alternatives

The No Action alternative would not impact cultural resources.

The X-4 Pad area has been surveyed for cultural resources, while the Urban Test Grid and the Proposed Action site have only been partially surveyed.

It is unlikely that testing at any of the sites would cause significant disturbance to or adversely affect cultural resource sites.

5.9 Traffic and Transportation

This section analyzes the potential impacts of the Proposed Action and alternatives to traffic and transportation resources at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.9.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to transportation and traffic from the Proposed Action or alternatives would be considered significant if they were to:

- ◆ Future travel demands require major roadway capacity enhancements or would result in higher levels of highway maintenance.
- ◆ Training or testing activity requires major investment in non-highway transportation infrastructure.
- ◆ Transportation requirements for DPG's mission generate widespread and recurrent congestion for the traveling public or result in other disruptions or inconvenience to off-installation civilian travel and shipment of goods.
- ◆ Transportation of materials and wastes requires new or changed management procedures, infrastructure, equipment, or routes.

5.9.2 Impacts of the Proposed Action

The Proposed action would not cause future travel demands requiring major roadway capacity enhancements or would result in substantially higher levels of highway maintenance.

The Proposed action would not cause training or testing activity requiring major investment in non-highway transportation infrastructure.

The Proposed action would not cause transportation requirements for DPG's mission generating widespread and recurrent congestion for the traveling public or resulting in other disruptions or inconvenience to off-installation civilian travel and shipment of goods.

The Proposed action would not cause transportation of materials and wastes requiring new or changed management procedures, infrastructure, equipment, or routes.

5.9.3 Impacts of the Alternatives

The No Action alternative would maintain present transportation and traffic requirements, barring a natural or man-made disaster.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause future travel demands, require major roadway capacity enhancements or result in substantially higher levels of highway maintenance.

Testing at any of the alternate sites would not cause training or testing activities requiring major investment in non-highway transportation infrastructure.

Testing at any of the alternate sites would not cause transportation requirements for DPG's mission to generate widespread and recurrent congestion for the traveling public or result in other disruptions or inconvenience to off-installation civilian travel and shipment of goods.

Testing at any of the alternate sites would not cause transportation of materials and wastes requires new or changed management procedures, infrastructure, equipment, or routes.

5.10 Visual Resources

This section analyzes the potential impacts of the Proposed Action and alternatives to visual resources at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.10.1 Significance Criteria

Impacts must be evaluated with criteria to determine whether or not they are significant. Potential impacts to visual resources would be considered significant if the Proposed Action or alternatives were to largely degrade the natural or constructed physical features at DPG that provide the DPG landscape its character and value as an environmental resource.

5.10.2 Impacts of the Proposed Action

The visual character of the site is typical of a salt desert playa and the visual sensitivity of the area is low.

The Proposed action would not cause large degradation of the natural or constructed physical features at DPG that provide the DPG landscape its character and value as an environmental resource.

The Proposed Action is not anticipated to significantly impact the visual character of DPG.

5.10.3 Impacts of the Alternatives

The No Action alternative would maintain, approximately, the present visual sensitivities at DPG.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not substantially degrade the natural or constructed physical features at DPG that provide the DPG landscape its character and value as an environmental resource.

It is not anticipated that testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would significantly impact the visual character of DPG.

5.11 Noise

This section analyzes the potential impacts of the Proposed Action and alternatives to noise levels at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.11.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Noise impacts resulting from the Proposed Action or alternatives would be considered significant if they were to cause:

- ◆ Important impacts to people, including health impacts and changes to the Human, social, and cultural environment.
- ◆ Weighty economic impacts.
- ◆ Important impacts to structures.
- ◆ Weighty impacts to wildlife.
- ◆ Important noncompliance with applicable noise regulations or guidelines.
- ◆ An increase in noise by day-night average sound level (DNL)¹ 1.5 decibels (dB) or more for a noise sensitive area² that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe (FAA Order 1050.1F).

5.11.2 Impacts of the Proposed Action

Noise factors would not change appreciably since military testing has been conducted for many years at DPG with attendant production of noise from overhead aircraft, explosive detonations, launching of rockets and mortars, artillery fire, and vehicular travel.

Noise impacts from off-road vehicle operations would be minimal. The proposed action complies with the Noise Control Act of 1972 (42 U.S.C.A. §§ 4901-4918).

The FEIS states: “No data are available to determine the specific impacts of noise and blast overpressure or their significance on DPG’s wildlife species.” Under the Proposed Action, certain sources of noise, such as vehicle use, would increase. However, the greatest source of noise at DPG is Air Force air testing, Reserve and Active Duty artillery and small arms fire, and explosive ordinance disposal operations. Because of the remoteness of DPG and lack of encroachment on its borders, noise from the principal noise makers is generally restricted to, and impacts, those in relatively close proximity. Noise complaints by the public to the DPG Public Affairs Office are rare.

The Proposed Action would not cause impacts to people, including health impacts and changes to the human, social, and cultural environment.

The Proposed Action would not cause substantial economic impacts.

¹ DNL is the 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 a.m., and between 10 p.m. and midnight, local time.

² A noise sensitive area is an area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife and waterfowl refuges, and cultural and historical sites.

The Proposed Action would not cause substantial impacts to structures. However, landings of the Boeing CST may cause sonic booms near the landing area. Sonic boom analysis results indicate no significant overpressure would occur at DPG or neighboring communities. The Proposed Action would not cause weighty impacts to wildlife.

The Proposed Action would not cause important noncompliance with applicable noise regulations or guidelines.

5.11.3 Impacts of the Alternatives

The No Action alternative would maintain, approximately, present noise levels.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would produce increases to noise levels similar to the Proposed Action.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause impacts to people, including health impacts and changes to the Human, social, and cultural environment.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause weighty economic impacts.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause important impacts to structures.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause weighty impacts to wildlife.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause important noncompliance with applicable noise regulations or guidelines.

5.12 Sonic Boom Analysis

5.12.1 Dugway Sonic Boom Footprints

Sonic booms are measured in pounds per square foot (psf) of overpressure. This is the amount of the increase over the normal atmospheric pressure (2,116 psf/14.7 psi). At one pound overpressure, no damage to structures would be expected. Overpressures of 1 to 2 psf are produced by supersonic aircraft flying at normal operating altitudes. Some public reaction could be expected between 1.5 and 2 psf. Rare minor damage may occur with 2 to 5 psf overpressure.

As overpressure increases, the likelihood of structural damage and stronger public reaction also increases. Tests, however, have shown that structures in good condition have been undamaged by overpressures of up to 11 lb. Sonic booms produced by aircraft flying supersonic at altitudes of less than 100 feet, creating between 20 and 144 psf overpressure, have been experienced by humans without injury.

Reference: <https://www.nasa.gov/centers/armstrong/news/FactSheets/FS-016-DFRC.html>

5.12.2 Sonic Boom Computation

The sonic boom footprint was computed for the Starliner spacecraft using NASA-provided PCBoom software. The sonic boom is generated while the Starliner is traveling at supersonic speed during its descent to the landing site. The Starliner could approach the landing site with an approach from the northwest (entry from a descending node of the Starliner orbit) or from the southwest (entry from an ascending node of the Starliner orbit). The trajectory selected for a particular landing would be based on several factors, including selecting a de-orbit that allows for one or more backup opportunities, time of day, and weather.

5.12.3 Trajectory and Sonic Boom Footprint Illustrations

Figure 5-1 shows the northwest descending node trajectory to Dugway. Figure 5-2 shows the sonic boom footprint for this trajectory. Figure 5-3 shows the southwest ascending node trajectory. Figure 5-4 shows the sonic boom footprint for this trajectory. The highest sonic boom overpressure indicated by NASA computations is 0.5 psf, in the remote area of approach to the target landing site. An overpressure of 0.5 psf equates to a C-weighted Day-Night Average Sound Level (DNL) of 24 dB, which is well below the FAA's noise significance threshold of 65 dB. No significant sonic boom overpressure is indicated for DPG or neighboring communities.

5.13 Health and Safety

This section analyzes the potential impacts of the Proposed Action and alternatives to health and safety at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented as follows.

5.13.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to health and safety would be considered significant if the Proposed Action or alternatives were to:

- ◆ Cause a compelling change in the existing occupational health and safety requirements and procedures as prescribed in AR 385-10.
- ◆ Require important new occupational health and safety procedures as prescribed in AR 385-10.
- ◆ Result in an increased injury/illness incident rate.
- ◆ Result in public exposure to chemical or biological agents or hazardous materials.
- ◆ Endanger public health or safety.

Figure 5-1 Northwest Descending Node Trajectory to Dugway

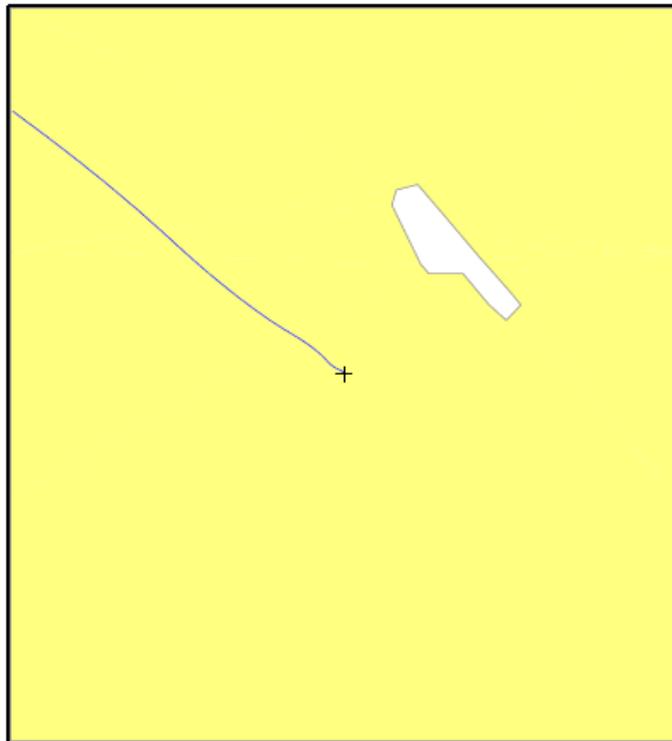
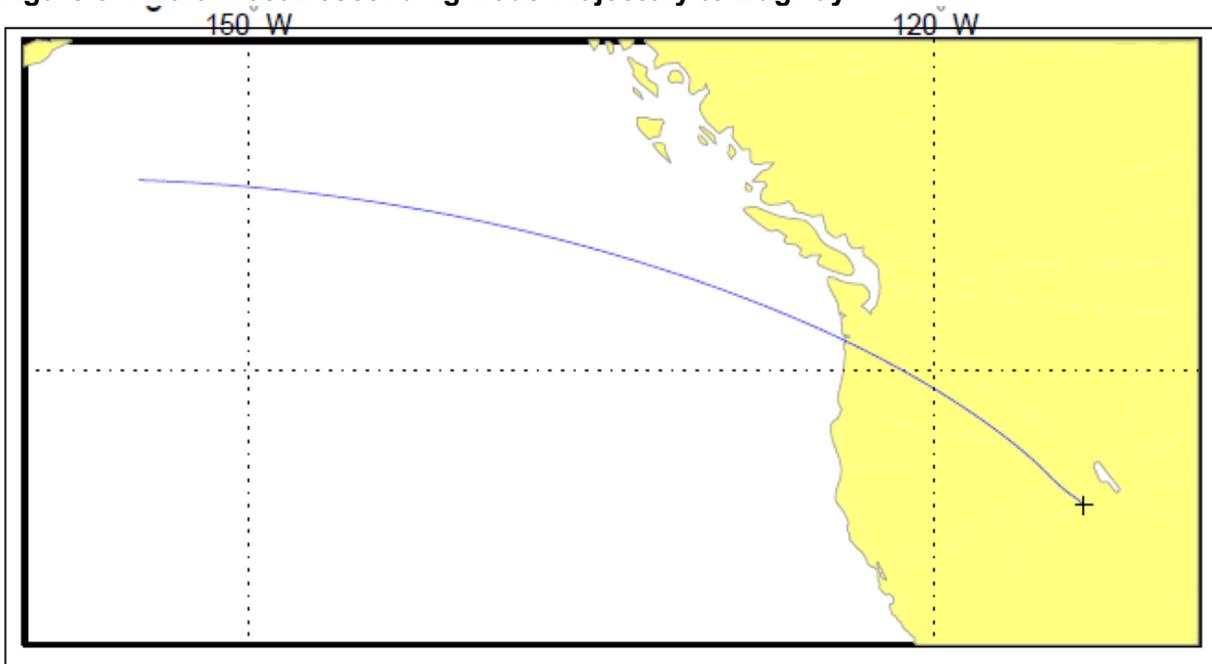


Figure 5-2 Sonic Boom Footprint for Northwest Trajectory

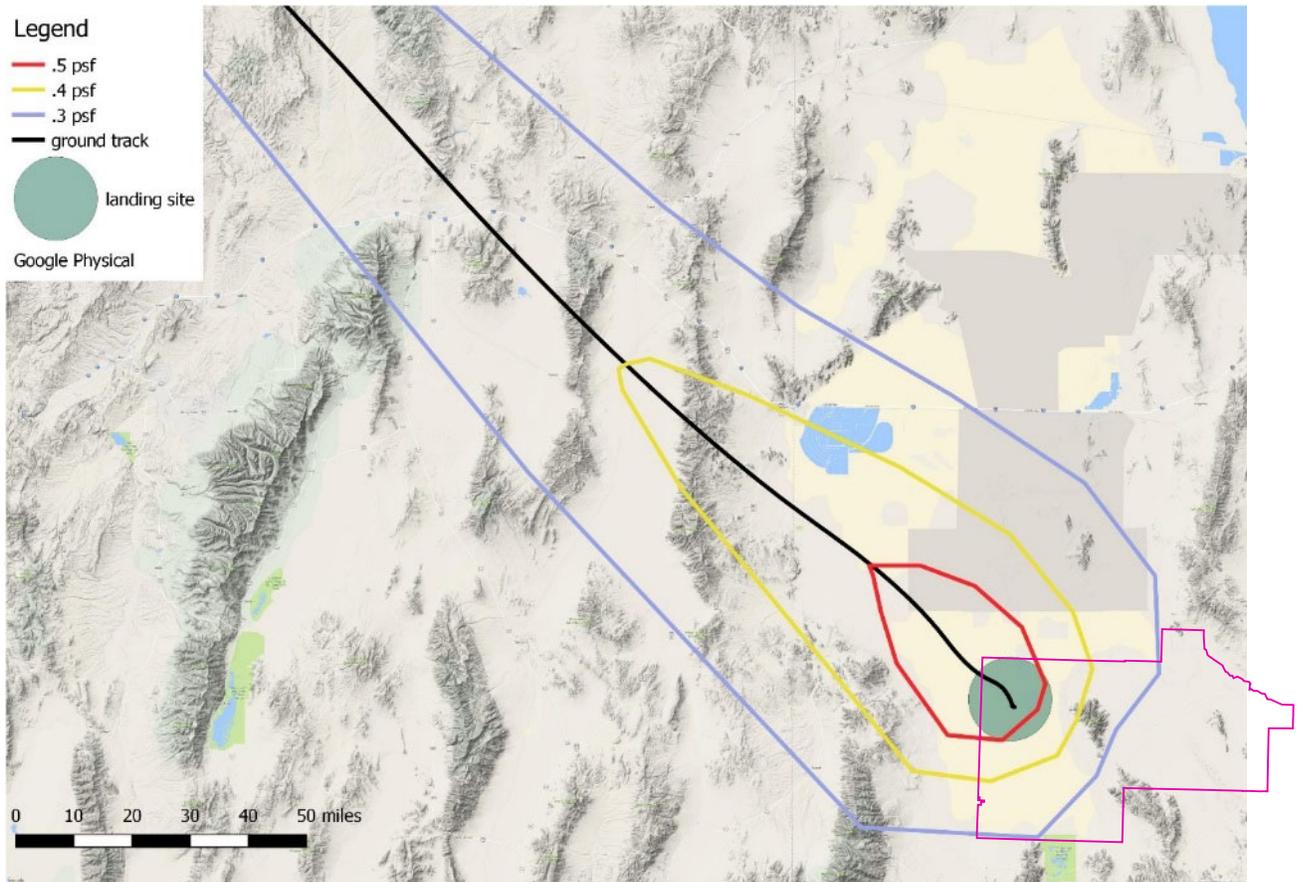


Figure 5-3 Southwest ascending Node Trajectory to Dugway

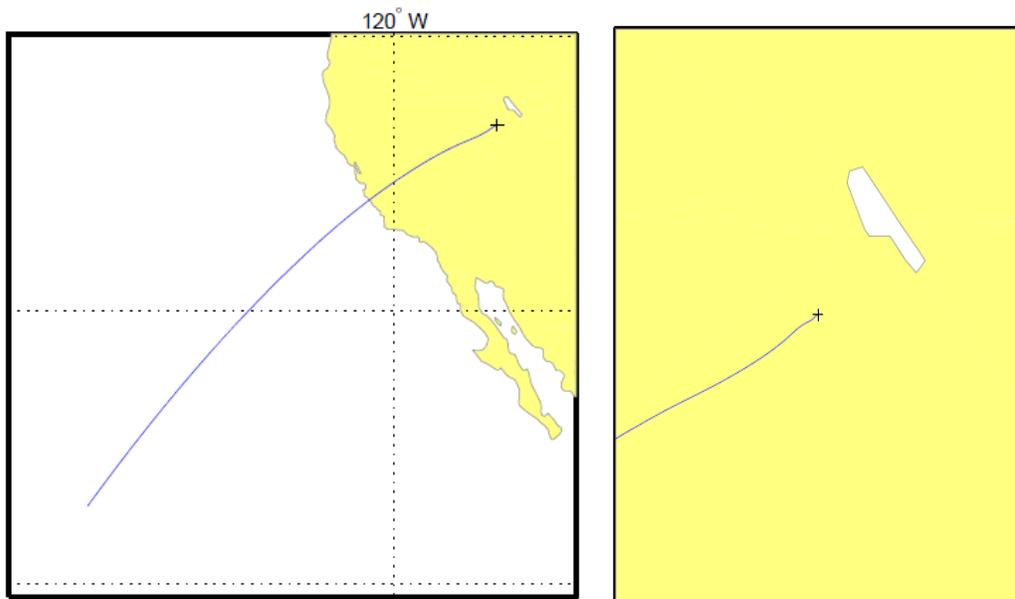
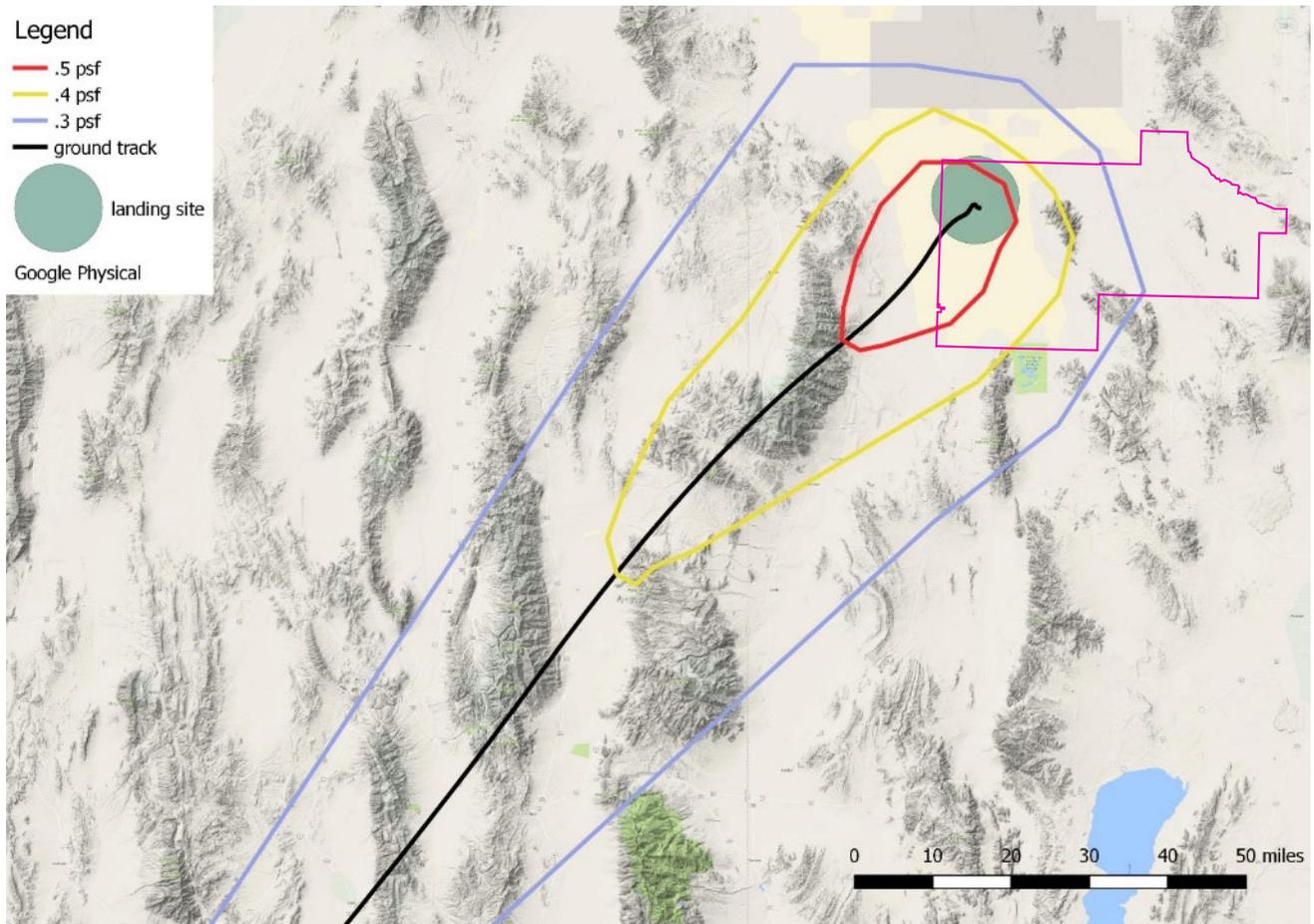


Figure 5-4 Sonic Boom Footprint for Southwest Trajectory



5.13.2 Impacts of the Proposed Action

It is not anticipated that the action would significantly impact the health and safety of DPG test participants, DPG residents, or those residing in neighboring communities.

The Proposed Action would not cause a large change in the existing occupational health and safety requirements and procedures as prescribed in AR 385-10.

The Proposed Action would not require important new occupational health and safety procedures as prescribed in AR 385-10.

The Proposed Action would not result in an increased injury/illness incident rate.

The Proposed Action would not result in public exposure to chemical or biological agents or hazardous materials.

The Proposed Action would not endanger public health or safety.

5.13.3 Impacts of the Alternatives

The No Action alternative would maintain, approximately, present health and safety levels, barring a natural or man-made disaster.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would, like the Proposed Action, would have no significant impact on the health and safety of DPG test participants, DPG residents, or those residing in neighboring communities.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause a large change in the existing occupational health and safety requirements and procedures as prescribed in AR 385-10.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not require important new occupational health and safety procedures as prescribed in AR 385-10.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not result in an increased injury/illness incident rate.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not result in public exposure to chemical or biological agents or hazardous materials.

The Proposed Action would not endanger public health or safety.

5.14 Waste Management

This section analyzes the potential impacts of the Proposed Action and alternatives to waste management at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.14.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to material and waste resulting from the Proposed Action or alternatives would be considered significant if one or more of the following occurs:

- ◆ Existing material storage or RCRA-permitted storage space would be inadequate to accommodate any increase in material or waste volume.
- ◆ New material is introduced or a new waste stream is generated that would require special storage or handling considerations above what is presently managed at DPG.
- ◆ New material or waste streams are introduced that would require large-scale development of new standard operating procedures (SOPs) and management plans.
- ◆ Material/waste volume increase or new material/waste is introduced that would cause DPG to be out of compliance with Federal, state, or local environmental regulations.

- ◆ Material/waste volume increase or new material/waste is introduced that would require the application for additional environmental permits or revisions to existing permits to comply with Federal, state, or local environmental regulations.

5.14.2 Impacts of the Proposed Action

DPG has a Resource Conservation and Recovery Act (RCRA) state permitted treatment and storage facility. The Project Officers, scientists, test technicians and test participants would generate moderate amounts of waste, in the form of food wrappers, empty water and soda containers, deposits into portable toilets, etc. DPG has a recycling official and the proponent would be required to recycle to the maximum extent that is economically feasible. The proposed action is not anticipated to significantly impact waste management on DPG.

The Proposed Action would not cause existing material storage or RCRA-permitted storage space to be inadequate to accommodate any increase in material or waste volume.

The Proposed Action would not cause new material to be introduced or a new waste stream to be generated that would require special storage or handling considerations above what is presently managed at DPG.

The Proposed Action would not cause new material or waste streams to be introduced that would require large-scale development of new SOPs and management plans.

The Proposed Action would not cause Material/waste volume increase or new material/waste to be introduced that would cause DPG to be out of compliance with Federal, state, or local environmental regulations.

The Proposed Action would not cause Material/waste volume increase or new material/waste to be introduced that would require the application for additional environmental permits or revisions to existing permits to comply with Federal, state, or local environmental regulations.

5.14.3 Impacts of the Alternatives

The No Action alternative would maintain, approximately, the same waste management operations.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would generate moderate amounts of waste similar to the Proposed Action. Similarly, it is not anticipated that testing at any of the alternate sites, would significantly impact waste management.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause existing material storage or RCRA-permitted storage space to be inadequate to accommodate any increase in material or waste volume.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause new material to be introduced or a new waste stream to be generated that would require special storage or handling considerations above what is presently managed at DPG.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause new material or waste streams to be introduced that would require large-scale development of new SOPs and management plans.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause material/waste volume increase or new material/waste to be introduced that would cause DPG to be out of compliance with Federal, state, or local environmental regulations.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause material/waste volume increase or new material/waste to be introduced that would require the application for additional environmental permits or revisions to existing permits to comply with Federal, state, or local environmental regulations.

5.15 Energy

This section analyzes the potential impacts of the Proposed Action and alternatives to energy at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.15.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to energy resources from the Proposed Action or alternatives would be considered significant if:

- ◆ Actions are undertaken that would undermine the purpose of the National Energy Conservation Policy Act of 1978 (NECPA) which is “to provide for the regulation of interstate commerce, to reduce the growth in demand for energy in the United States, and to conserve nonrenewable energy resources produced in this Nation and elsewhere, without inhibiting beneficial economic growth” (42 USC 8201(b)).
- ◆ It has an adverse effect on the supply, distribution or use of energy in the test area.

5.15.2 Impacts of the Proposed Action

The Proposed Action involves a relatively small amount of fossil fuel use. The total amount of fuel use is insignificant in comparison to existing ground vehicle (both government and private) use, office and home heating use, and aircraft fuel use currently occurring at DPG. The proposed action is not anticipated to significantly impact availability of fuel on DPG.

The Proposed Action would not cause actions that would undermine the purpose of the NECPA which is “to provide for the regulation of interstate commerce, to reduce the growth in demand for energy in the United States, and to conserve nonrenewable energy resources produced in this Nation and elsewhere, without inhibiting beneficial economic growth” (42 USC 8201(b)).

The Proposed Action would not cause adverse effect on the supply, distribution or use of energy in the test landing area.

5.15.3 Impacts of the Alternatives

The No Action alternative would maintain, approximately, present energy requirements, barring a natural or man-made disaster.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would generate limited fuel requirements similar to the Proposed Action. Similarly, it is not anticipated that testing at any of the alternate sites, would significantly impact availability of fuel on DPG.

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause actions that would undermine the purpose of the NECPA which is “to provide for the regulation of interstate commerce, to reduce the growth in demand for energy in the United States, and to conserve nonrenewable energy resources produced in this Nation and elsewhere, without inhibiting beneficial economic growth” (42 USC 8201(b)).

Testing at any of the alternate sites at X-4 Pad and the Urban Test Grid would not cause adverse effect on the supply, distribution or use of energy in the test area.

5.16 Climate

This section analyzes the potential impacts of the Proposed Action and alternatives to energy at DPG and the surrounding area. The criteria used to evaluate whether these potential impacts are considered significant are presented.

5.16.1 Significance Criteria

Impacts must be evaluated with identified criteria to determine whether or not they are significant. Impacts to climate from the Proposed Action or alternatives would be considered significant if:

- ◆ We substantively increase greenhouse gasses.
- ◆ Any irreversible or irretrievable action would permanently change the climate of the area.

5.16.2 Impacts of the Proposed Action

Increasing concentrations of greenhouse gases in the atmosphere have the potential to cause climate change. The administrative use of vehicles and other energy-consuming equipment is monitored by the USAG and LRC DPG for abuse and unnecessary use beyond that needed to maintain the mission. Engines would be turned off when vehicles and equipment are parked unless maintenance operations require the engine to be running. Generators would only be used when necessary and turned off when not in use. Energy consumption to remove contaminated soil from the property would not be considered excessive for the action. The

Starliner does not produce any greenhouse gases as it re-enters and lands. No significant impacts are anticipated.

Vehicle operations required by the proposed action are not anticipated to produce significant amounts of greenhouse gases. In a letter dated April 15, 2009, the Under Secretary of Defense (Installations and Environment) directed that "All DoD Components should cease any publication of greenhouse gas data until the uniform protocol for collection and reporting is adopted." Pursuant to this policy, no greenhouse gas data has been collected for publishing in this SEA.

The Proposed Action would not substantively increase green-house gasses.

The Proposed Action would not cause any irreversible or irretrievable action that would permanently change the climate of the area.

5.16.3 Impacts of the Alternatives

The No Action alternative would continue current operations, existing energy use would not change.

Conducting the landing tests at the alternate sites at X-4 Pad and the Urban Test Grid would not produce significant amounts of greenhouse gases and would not significantly affect the environment. The difference in production of greenhouse gases between the proposed action and if the landing tests were conducted at any of the other alternative sites is not significant.

Conducting the tests at the alternate sites at X-4 Pad and the Urban Test Grid would not substantively increase greenhouse gasses.

Conducting the tests at the alternate sites at X-4 Pad and the Urban Test Grid would not cause any irreversible or irretrievable action that would permanently change the climate of the area.

5.17 Department of Transportation Act Section 4(f)

Section 4(f) of the US Department of Transportation Act of 1966 (now codified at 49 U.S.C. § 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites listed or eligible for listing on the National Register of Historic Places. 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 use of that land and the program or project includes all possible planning to minimize harm resulting from the use.

Impacts would be significant if the proposed action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the project would substantially impair the Section 4(f) resource (FAA Order 1050.1F). Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.

For Section 4(f) purposes, a proposed action would “use” a property in one of two ways:

- Physical use: the action physically occupies and directly uses the Section 4(f) resource. An action’s occupancy or direct control (via purchase) causes a change in the use of the Section 4(f) resource.
- Constructive use: the action indirectly uses a Section 4(f) resource by substantially impairing the resource’s intended use, feature, or attributes.

All reentry activities would occur within DPG property. The only potential for an effect to a Section 4(f) property would be from the sonic boom produced during reentry. The sonic boom would occur a maximum of four times per year, would be short term in duration (less than a second), and, while noticeable, would not cause any impacts or damage due to the small magnitude of the overpressure—a maximum of 0.5 pounds per square foot (psf), which is less than a clap of thunder. Therefore, the FAA has determined there would be no use of a Section 4(f) property and thus no significant impacts on a Section 4(f) property. Because the FAA finds there would be no physical use or constructive use, there is no requirement to engage in consultation with 4(f) property officials with jurisdiction or make a 4(f) determination (e.g., reach a *de minimis* determination or conduct a 4(f) evaluation).

5.18 Indirect Effects

The infrastructure of the landing test site is not likely to have a cumulative effect on the environment. This is because the site is remote from other sites, it will not have many persons present and it will not require the construction of sewage lagoons or elaborate water supply. The site will be a low maintenance and low upkeep site.

The proposed Boeing CST landing test site is located within an area used as an active range by both the Army and the Air Force. There has been previous testing/training impact to the area. A dudded (Wig Mountain) impact area is located along the northern boundary of DPG and there are MEC (munitions and explosives of concern) and military munitions fragments present. Because of its designation as an active range, the presence of a dudded impact area, and the projected continued use as an active range, the Boeing CST landings are not predicted to contribute significantly to the cumulative impact on the environment.

There will not be indirect effects with chemical and biological simulants, chaff, helicopter noise, and ordnance in the proposed area or the alternative areas. Those activities will not be conducted at the considered areas because of the need to keep other test activities away from the eventual Boeing CST landing location.

Effects of the proposed action would not significantly contribute to or cause significant cumulative impacts on environmental resources in the area of DPG, UTTR, and West Desert, Utah. But the UTG and X-4 Pad alternative sites are also unlikely to have measurable indirect effects on the human environment.

5.19 Cumulative Effects

The infrastructure of the landing site is not likely to have a cumulative effect on the environment. This is because the site is remote from other sites, it will not have many persons present and it will not require the construction of sewage lagoons or elaborate water supply. The site will be a low maintenance and low upkeep site.

The proposed Boeing CST landing site is located within an area used as an active range by both the Army and the Air Force. There has been previous testing/training impact to the area. A dudded (Wig Mountain) impact area is located along the northern boundary of DPG and there are MEC (munitions and explosives of concern) and military munitions fragments present. Because of its designation as an active range, the presence of a dudded impact area, and the projected continued use as an active range, the Boeing CST landings are not predicted to contribute significantly to the cumulative impact on the environment.

There will not be cumulative effects with chemical and biological simulants, chaff, helicopter noise, and ordnance in the proposed area or the alternative areas. Those activities will not be conducted at the considered areas because of the need to keep other test activities away from the eventual Boeing CST landing location.

Effects of the Proposed Action would not significantly contribute to or cause significant cumulative impacts on environmental resources in the area of DPG, UTTR, and West Desert, Utah. But the UTG and X-4 Pad alternative sites are also unlikely to have measurable cumulative effects on the human environment.

CHAPTER 6. CONCLUSIONS

Based on the analysis, no significant adverse changes in environmental conditions are expected from implementation of the proposed action compared to the baseline condition as represented in the *Environmental Assessment for Range Capabilities Improvements in Support of Development of TTPs at U.S. Army Dugway Proving Ground*, June, 2011. Due to the adequacy of existing plans, regulations, and procedures and though the implementation of additional protective measures and mitigation plans; no significant effects on air resources, human health and public safety, hydrology and water resources, land use, solid and hazardous waste generation or disposal, and recreation are anticipated. Impacts to cultural and historic resources, biological resources, geology and soils, could occur, but would not be significant. Surface disturbance, soil compaction, loss of vegetation, increased risk of wildfires and soil and wind erosion are potential direct and indirect, but not significant, impacts to biological resources, geology, and soils, which could occur from implementation of the proposed action, but would not be significant.

The proposed action is in the interest of advancing space travel technology. The action is required to support the US space program.

After reviewing the bird species that may be impacted by the action, the number of birds, and the distribution of such species, DPG has determined that the action as proposed will not have a significant adverse impact any population of migratory bird species.

This SEA supports the DPG Commander's finding of no significant environmental impact from Boeing CST-100 landings on DPG. In support of future landings of the Boeing CST-100, RECs would be prepared to document, for the administrative record, the environmental analysis for those specific proposed US Army actions.

The expertise of DPG management, scientists, meteorologists, technicians, subject matter experts, safety officers, and environmental protection personnel combined with operational controls and test range environmental monitoring preclude the possibility of a significant adverse environmental impact to DPG or the surrounding area. The proposed action would have no significant adverse effect on the environment or human health at DPG or neighboring lands and communities.

Strict adherence to appropriate environmental documents, test plans, safety plans, Safety Data Sheets, SOPs, US Army regulations, and Utah State and Federal law during test and landing operations at DPG, along with efforts to avoid, minimize, and mitigate any adverse environmental impact are sufficient mitigation measures to ensure that Boeing CST landing operations at DPG would not result in adverse effect to human health or environmental impacts. With these measures in place, an environmental impact statement is not required. Therefore, a finding of no significant impact (FNSI) statement has prepared for publication.

This SEA specifies that test landing operations must be in compliance with applicable environmental documents, test plans, safety plans, US Army regulations, DPG regulations, standard operating procedures (SOPs), and Utah State and Federal laws. All such regulatory and safety requirements would be met prior to test landing operations.

This SEA and the NASA and FAA FONSIs would support issuance of licenses and permits for Boeing CST-100 OFT and CFT. Once the FAA's Office of Commercial Space Transportation

(AST) has determined that this SEA and FAA FONSI NEPA documentation fully satisfies the FAA's requirements for NEPA compliance set forth in FAA Order 1050.1F, the AST can adopt the documentation and issue its own finding or decision to support issuance of a license or permit.

Non-approval of the proposed action would not be responsive to Boeing, NASA, FAA, or our Nation's requirements for improved space travel.

The proposed action currently fulfills nearly all of the selection criteria, while the alternatives do not meet Boeing, NASA, FAA or US requirements. Considering all relevant factors, the best course is the proposed action, which will not have significant impact on the environment. None of the actions – proposed or alternative – would require the writing of an environmental impact statement (EIS). The DPG commander should choose the proposed course of action.

CHAPTER 7. LIST OF PREPARERS, AGENCIES AND PERSONS CONSULTED

7.1. Preparer:

US Army Dugway Proving Ground
Operations Division
ATTN: Michael Robinson
Environmental Technology Office
Dugway, Utah 84022

7.2. Agencies Consulted about the Proposed Action

- Utah Test and Training Range (UTTR), Dugway & Hill Air Force Base
- Legal Office, US Army Dugway Proving Ground, Dugway, Utah
- Compliance Office, US Army Dugway Proving Ground, Dugway, Utah
- Confederated Tribes of the Goshute Reservations
- Counterintelligence Office, US Army Dugway Proving Ground, Dugway, Utah.
- Duckwater Shoshone Tribe
- Eastern Shoshone Business Council
- Ely Shoshone Tribe
- Environmental Division, US Army Dugway Proving Ground, Dugway, Utah
- Federal Aviation Administration
- National Aeronautics and Space Administration
- Navajo Nation
- Northwestern Band of Shoshone Nation
- Paiute Indian Tribe of Utah
- President of Terra Community Association
- Pueblo of Zuni
- Shoshone-Bannock Tribes of the Fort Hall Reservation
- Skull Valley Band of Goshute Indians of Utah
- Special Programs Division, West Desert Test Center, US Army Dugway Proving Ground, Dugway, Utah
- Te-Moak Tribe of Western Shoshone
- The Hopi Tribe
- Tooele County Commissioners
- US Department of the Interior, Fish and Wildlife Service (Fish Springs)
- Utah State Historic Preservation Officer, Utah Division of State History
- Ute Indian Tribe

7.3. Persons Consulted

- Bate, John, Environmental Protection Specialist
- Bryant, Becki, Public Affairs Officer
- Carter, Jeffrey, Environmental Protection Specialist
- Czelusniak, Daniel, Commercial Space Transportation, Federal Aviation Administration
- Dankert, Donald, National Aeronautics and Space Administration
- Fawcett, Michael, Senior Engineer/Special Aerospace Services Boeing Commercial Crew Transportation System
- Gritton, Kenneth, Technical Director, DPG
- Knight, Robert, Wildlife Biologist, Natural Resource Coordinator
- Krippner, Phillip, Safety Officer
- Marvel, Keeli, Natural Resource Specialist
- Mason, Gerald, Environmental Protection Specialist
- Mathis, Jared, Geographic Information System Technician
- McArdle, Suzanne, Boeing Corporation
- Quist, Rachel, Archaeologist, Cultural Resource Manager
- Raff, Jason, Geographer
- Reed, Jason, Chief, Compliance and Restoration
- Roberts, Boyd, Environmental Protection Specialist
- Robinson, Bonnie, Public Affairs Specialist, Public Affairs Office
- Saxon, Robert, Public Affairs Officer
- Schmidt, Eric, Biological Engineer
- Shane, Michael, Environmental Protection Specialist, Hill Air Force Base
- Sheffey, Steve, Physical Scientist
- Skeen, Jack, Environmental Law Attorney
- Smith, Jedediah, DPG, Chief, Personnel Security
- Wendt, Scott, Biological Safety Officer

7.5 Members of the public attending the 25 January 2016 Public Scoping Meeting, Dugway, UT: No members of the Dugway community attended the meeting.

7.6 Members of the public attending the 26 January 2016 Public Scoping Meeting, Tooele, UT: No members of the Tooele community attended the meeting.

7.7 Members of the public attending the 02 February 2016 Public Scoping Meeting, Trout Creek, UT: Eight members of the Trout Creek community attended the meeting.

7.8 Members of the public attending the 03 February 2016 Public Scoping Meeting, Salt Lake City, UT: Four members of the Salt Lake City community attended the meeting.

7.9 Members of the Wendover and surrounding communities attending the Wendover Public Meeting held on 04 February 2016. Four members of the Wendover community attended the meeting.

CHAPTER 8. REFERENCES

- 32 CFR 651 Environmental Analyses of Army Actions, (29 March 2002)
- AR 200-1 Environmental Protection and Enhancement (13 December 2007)
- AR 385-69 Biological Defense Safety Program (31 December 1993)
- Programs at U.S. Army Dugway Proving Ground, Utah, September, 2005.
- Department of Transportation Order 5650.2, *Floodplain Management and Protection*.
- Environmental Assessment for Range Capabilities Improvements in Support of Development of TTPs at U.S. Army Dugway Proving Ground, June, 2011
- Environmental Assessment for Implementation of an Integrated Cultural Resource Management Plan for Dugway Proving Ground, Tooele County, Utah Final, (12 February 2004).
- Environmental Assessment for Test Materials to Be Used In Laboratory, Chamber, and Field Tests at U.S. Army Dugway Proving Ground, Dugway, Utah, (May 2005).
- Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management.
- Executive Order 13112, Invasive Species.
- Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance.
- Federal Aviation Administration Order 1050.1F.
- Final Environmental Assessment for Active and Reserve Components Development of TTPs at U.S. Dugway Proving Ground, December, 2003.
- Final Environmental Impact Statement for Activities Associated with Future Programs at U.S. Army Dugway Proving Ground, Utah, (31 August 2004).
- Habitat Survey Report
- Integrated Natural Resource Management Plan and Environmental Assessment 2006 - 2010, U.S. Army Dugway Proving Ground, (05 April 2007), 262 pages.
- Record of Environmental Consideration for Boeing Drag Test and Soil Samples at U.S. Army Dugway Proving Ground, Utah, (December 2017).
- Record of Environmental Consideration for First Article Test and Ballistic Lot Acceptance Test of the M314A3 Projectile, Metal Parts, 105-mm Illuminating at U.S. Army Dugway Proving Ground, Dugway, Utah, June 2004.
- Record of Decision Final Environmental Impact Statement for Activities Associated with Future Programs at U.S. Army Dugway Proving Ground, Utah, September, 2005.
- The 1990 Clean Air Act, as amended.
- The Clean Water Act, 1977 amendment to the Federal Water Pollution Control Act of 1972.
- The National Environmental Policy Act of 1969, as amended.
- The National Historic Preservation Act of 1966, as amended.
- U.S. Department of Transportation Act of 1966 (codified at 49 United States Code § 303).

APPENDIX A. Boeing CST Public Meeting Presentation

Boeing Commercial Space Transport – 100 Public Scoping Meeting

Special Programs Division
Dugway Proving Ground



U.S. Army Test and Evaluation Command





Dugway Proving Ground



- 1 of 7 Major Range and Test Facility Bases (MRTFB) under the Army Test and Evaluation Command (ATEC)
- Supports defense capabilities including Chemical, Biological, Radiological, and Explosives (CBRE)
- DPG employs scientists, engineers, environmental specialists, and additional support personnel





Scope of Program



DPG will conduct multiple efforts in support of the Boeing Commercial Space Transporter – 100 (CST-100) as a part of NASA's Commercial Crew Development (CCDev) initiative. The CST-100 is a spacecraft/system designed to affordably, reliably, and safely transfer crew from the Earth's surface to orbiting space complexes and return home. Destinations in low earth orbit include the International Space Station and the Bigelow Space Complex.

NASA's investment in CCDev, coupled with Boeing's own resources, has allowed significant progress to be made toward flying a first crewed mission by 2017.





Why conduct this effort at DPG?



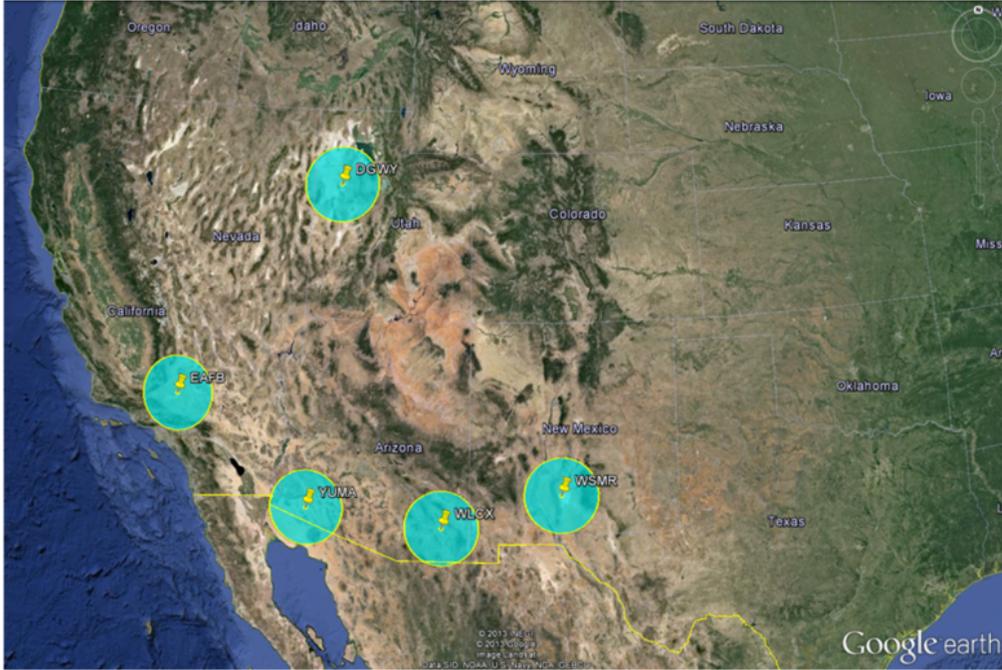
This type of effort requires 3 critical components

1. Range space of suitable size and terrain
2. Air space that can be controlled during landing windows
3. Predictable weather patterns



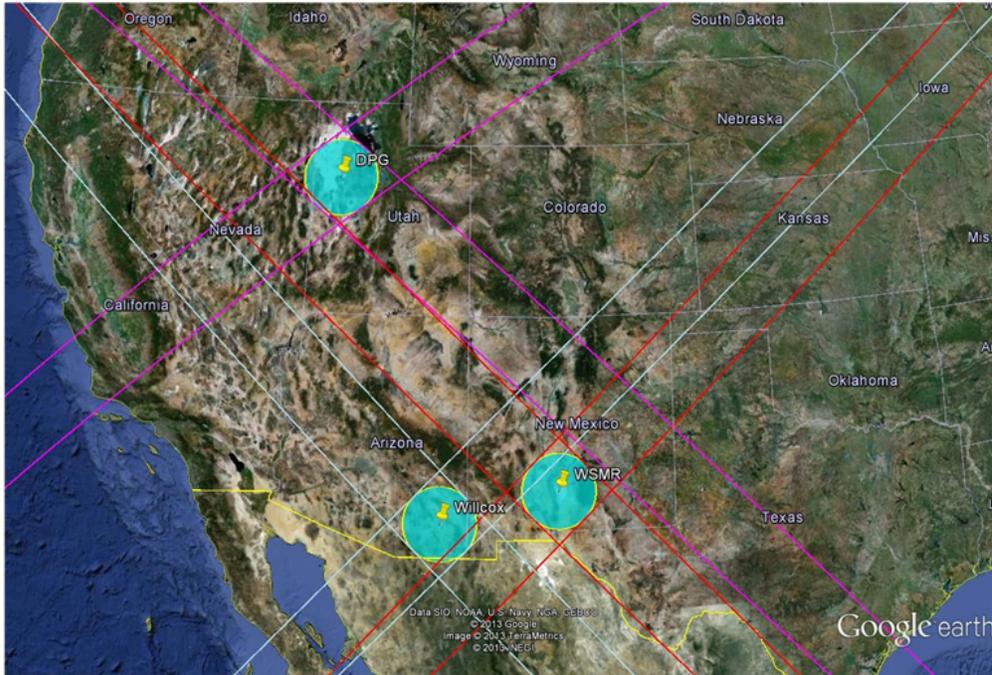


Landing Site Map



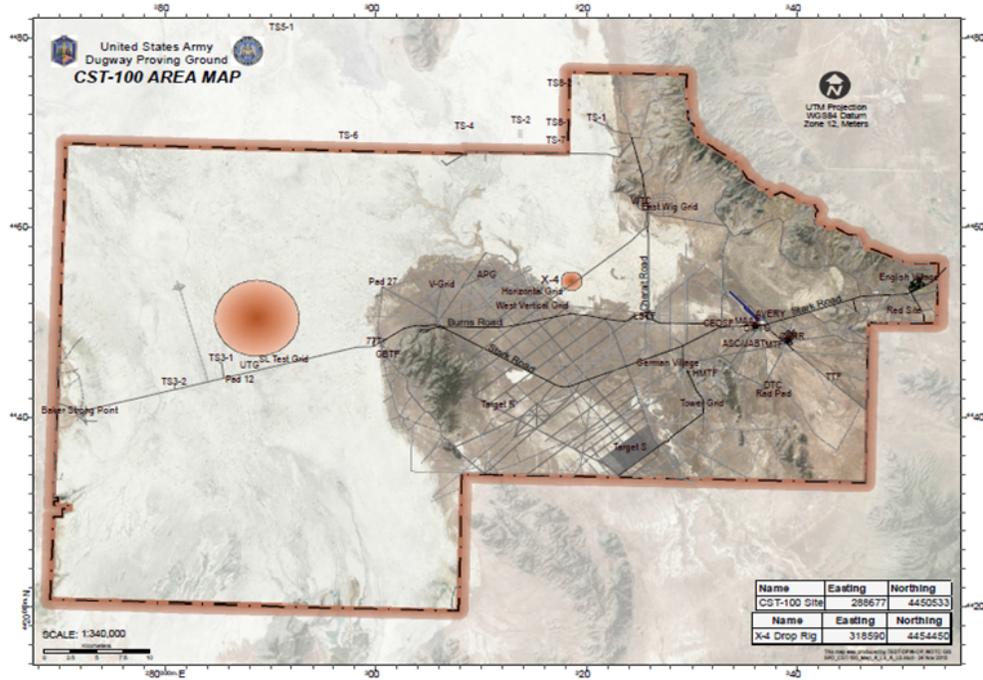


Landing Trajectories



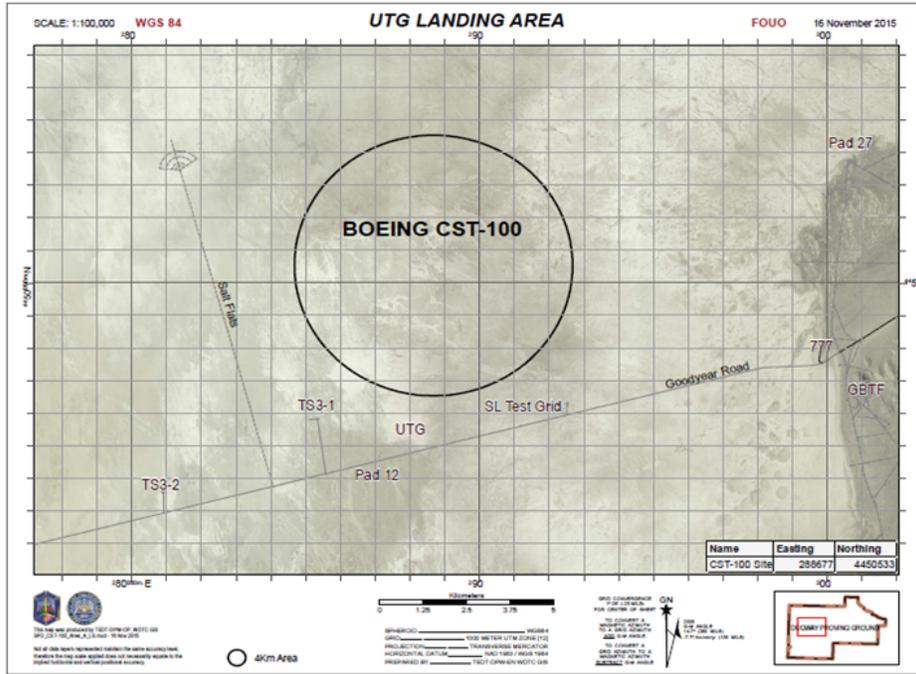


Landing Site Map (cont)





Landing Site Map (cont)





Balloon Drop Test



- The balloon drop tests will consist of a test article integrated to a balloon and released from an altitude of ~40k ft(+2k ft)
- Purpose of test is to collect parachute data for model correlation, i.e., parachute inflation characteristics and landing system performance that includes the rate of descent of the CST-100 and the attitudes at touchdown
- Four tests, between Spring and Winter 2016, will be performed with different parachute configurations

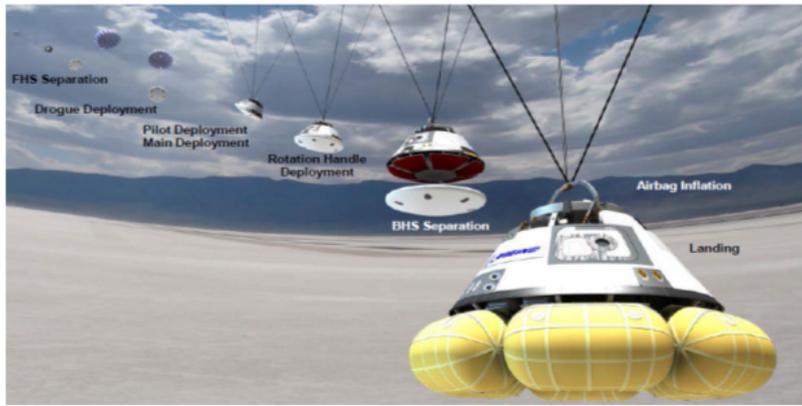




Landing Recovery



- Dugway Proving Ground is being asked to support the Orbital Flight Test, the Crewed Flight Test and all following Service Missions as a potential Primary Landing Site (PLS) or as a Back-up PLS in the case of a wave off of the nominal landing requiring a back-up landing site within as little as 8 to 24 hours or more after the scheduled landing.
- Orbital Flight Test landing scheduled for Winter/Spring 2017





Test Schedule



- Drop Test
 - Summer 2016
- Balloon Drop Test
 - Summer - Winter 2016
 - One test every 6 weeks
- Landing Recovery
 - Orbital Flight Test – Winter/Spring 2017
 - Crewed Flight Test – Spring/Summer 2017
 - Follow On – TBD
- DPG will be primary landing site once per calendar year
- DPG will be secondary landing site for 4 other scheduled landings per year



APPENDIX B. Public Meeting Comments

Public Meetings were held in the following cities:

Dugway, Utah, 26 January 2016
Tooele, Utah, 27 January 2016
Salt Lake City, Utah, 28 January 2016.
Wendover, Utah, 29 January 2016

A power-point slide briefing on the Boeing CST test (see Appendix A) was presented, followed by a discussion, with questions and answers, by the participants in the scoping meetings.

Dugway, Utah, Scoping Meeting

There were no citizens in attendance at the Dugway Scoping meeting held on 26 January 2016, at the US Army Dugway Proving Ground Army Community Services Conference Room, Building 5124, Dugway, Utah.

Tooele, Utah, Scoping Meeting

There were no citizens in attendance at the Tooele Scoping meeting held on 27 January 2016, at the Tooele County Building, First Floor Auditorium, 47 South Main Street, Tooele, Utah.

Salt Lake City, Utah, Scoping Meeting

The Salt Lake City Scoping Meeting was held on 28 January 2016, in Conference Room A, at the Salt Lake City Public Library, 210 East 400 South, Salt Lake City, Utah. In attendance were Ms. Cindy King, Utah Chapter, Sierra Club; Mr. Steve Erickson, Citizens Education Project; and two other concerned citizens.

The following environmental issues and concerns were expressed and discussed:

1. Ms. King asked about Dugway's medical care plan for astronauts in an emergency.

Answer: Mr. Wiborg stated that the crew would be flown to Houston for any medical care.

2. Ms. King asked why Salt Lake City Hospitals would not be asked to respond, especially in a life threatening situation.

Answer: Mr. Wiborg stated that he was talking to the University of Utah Hospital about responding to a life threatening situation involving the astronauts.

3. A citizen expressed concern that fuel (about 5 pounds on board during landing) or the heat shield might spark a wildfire. He requests that fire control suppression controls be addressed in the EA.

Answer: Mr. Wiborg stated that the Dugway Fire Department would be standing by at all landings to suppress fires, in the unlikely event they should occur. This will be addressed in the EA.

4. A citizen asked about information concerning the two heat shields.

Answer: The heat shields would be dropped from the CST-100 just before landing. While they would be hot, it is not anticipated that they would cause a fire upon impact. However, the Dugway Fire Department would be on hand to suppress fires, in the unlikely event they should occur.

5. A citizen asked what damage would be caused if the landing Boeing CST-100 missed the target landing area.

Answer: Landings would only be performed during stable weather conditions. It is highly unlikely that a landing would take place outside of the target landing area. However, a large buffer zone around the target landing area would accommodate safe landing if the space transit parachutes were blown off target outside of the landing area. The large area of DPG provides an even larger buffer zone. It is not anticipated that the space transit would ever land outside of DPG boundaries. No damage is anticipated for landings within DPG.

6. A citizen asked why Boeing would not land the capsule in water to avoid Utah populations.

Answer: Initially, space capsules were landed in the ocean. However, the damage to the capsules was extensive and they could not be used again. Landing on land will allow re-use of the Boeing CST.

Wendover, Utah, Scoping Meeting

A Scoping Meeting was held at the Wendover City Offices, 112 South Moriah Avenue, Wendover, Utah, on 29 January 2016. In attendance were three city councilmen and the city manager.

The following environmental issues and concerns were expressed and discussed:

1. The question was asked if this project would bring new jobs to Northern Utah.

Answer. No, the project will be supported with personnel already on the staff at DPG.

APPENDIX C. Public Comments Received

From: [Bryant, Becki M CIV USARMY ATEC \(USA\)](#)
To: [Raff, Jason N CIV USARMY USAG \(US\)](#); [Schmidt, Eric R CTR USARMY ATEC \(US\)](#); [Skeen, Jack C CIV USARMY USAG \(US\)](#); [Shields, Duane E CIV USARMY ATEC \(USA\)](#); [Kelly, William I CIV USARMY ATEC \(USA\)](#)
Subject: no comment from Utah FO US fish and wildlife Service (UNCLASSIFIED)
Date: Wednesday, February 13, 2019 12:48:08 PM

CLASSIFICATION: UNCLASSIFIED

FYI - please pass along to anyone not included but should be on this email.

Thanks,
becki

-----Original Message-----

From: Graham, Stephanie [mailto:stephanie_graham@fws.gov]
Sent: Wednesday, February 13, 2019 12:37 PM
To: Bryant, Becki M CIV USARMY ATEC (USA) <becki.m.bryant.civ@mail.mil>
Subject: [Non-DoD Source] Boeing CST-100

Becki,

We received your draft EA for the Dugway Proving Ground NEPA for Boeing CST-100. We do not have any comments.

Thanks,
Stephanie Graham

Stephanie Graham
Wildlife Biologist
Utah Field Office
US Fish and Wildlife Service
2369 West Orton Circle, Suite 50
West Valley City, UT 84119
(385) 285-7914

CLASSIFICATION: UNCLASSIFIED



THE PAIUTE INDIAN TRIBE OF UTAH

December 28, 2018

Aaron D. Goodman/Garrison Manager
Department of the Army

Mr. Goodman,

SUBJECT: Boeing Commercial Space Transport Landing at US Army Dugway Proving Ground

The Paiute Indian Tribe of Utah is in receipt of your letter dated December 3, 2018 and has reviewed the draft SEA and do not have any objections pertaining to the above name project. As you are aware the tribe supports the identification and avoidance of prehistoric archaeological sites and traditional cultural properties. We concur with your determination of eligibility and effort for this undertaking

The Paiute Indian Tribe of Utah sincerely appreciates your accomplishments and consideration you and your staff have made to consult with the tribes.

Thank You,

Dorena Martineau/ Cultural Resource Director
Paiute Indian Tribe of Utah
440 North Paiute Drive
Cedar City, Utah 84721
dmartineau@utahpaiutes.org
435-586-1112 ext. 107

APPENDIX D. Threatened, Endangered, and Species-at-Risk List for US Army Dugway Proving Ground (DPG), Utah

SOURCES

(updated 01 September 2006)

Utah Division of Wildlife Resources Wildlife Action Plan (UDWR WAP Tier I, II, or III) *Tier I* (Greatest Conservation Need, Includes ESA Listed and Candidate Species among others), *Tier II* (Intermediate Conservation Need, Includes UDWR Species of Concern), or *Tier III* (Conservation Concern; Often Requires More Information to Determine Conservation Need); UDWR SOC - Utah Division of Wildlife Resources Wildlife Species of Concern; UPIF PS - Utah Partners in Flight Priority Species; FWS BCC - US Fish and Wildlife Service Birds of Conservation Concern; BLM RPS - Bureau of Land Management Rare Plant Species. NatureServe N1-4, S1-4 - National (N) and State (S) rankings 1-5; 1 = Critically Imperiled, 2 = Imperiled, 3 = Vulnerable, 4 = Apparently Secure, and 5 = Secure. NHP RPS - Nevada Heritage Program Rare Plant Species. UNPS RPL W and ExH: Utah Native Plant Society Rare Plant List, Priority *ExH* = Extremely High, Priority *W* = Watch.

COMMON NAME SCIENTIFIC NAME STATUS* DPG INFORMATION:

BIRDS

American Avocet *Recurvirostra Americana* UDWR WAP Tier III; UPIF PS transient (spring), non-breeder; uses sewage lagoons

American White Pelican *Pelecanus erythrorhynchos* UDWR Tier II; UDWR SOC; UPIF PS vagrant, non-breeding

Bald Eagle *Haliaeetus leucocephalus* UDWR WAP Tier I; UDWR SOC; FWS BCC rare winter visitor, non-breeding

Black-Necked Stilt *Himantopus mexicanus* UDWR WAP Tier III; UPIF PS transient (spring), unlikely nester, uses sewage lagoons

Black Rosy-Finch *Leucosticte atrata* UDWR WAP Tier III; UPIF PS; FWS BCC vagrant (winter), non-breeder

Black-Throated Gray Warbler *Dendroica nigrescens* UDWR WAP Tier III; UPIF PS transient (spring, fall), unlikely nester,

Brewer's Sparrow *Spizella breweri* UDWR WAP Tier III; UPIF PS; FWS BCC resident (summer), unlikely nester

Broad-Tailed Hummingbird *Selasphorus platycercus* UDWR WAP Tier III; UPIF PS resident (summer), uncommon, unlikely nester

Bobolink *Dolichonyx oryzivorus* UDWR WAP Tier II; UDWR SOC, UPIF PS vagrant, non-breeding

Burrowing Owl *Athene cunicularia* UDWR WAP Tier II; UDWR SOC declining population, yearly nester and breeder

Caspian Tern *Sterna caspia* UDWR WAP Tier III transient (spring, fall); non-breeding

Eared Grebe *Podiceps nigricollis* FWS BCC non-breeding in Great Basin; vagrant (spring); non-breeding; uses sewage lagoons

Ferruginous Hawk *Buteo regalis* UDWR WAP Tier II; UDWR SOC, UPIF P; FWS BCC uncommon nester (frequency unknown)

Golden Eagle *Aquila chrysaetos* FWS BCC resident; 5 known nesting pairs on DPG

Grasshopper Sparrow *Ammodramus savaanarum* UDWR WAP Tier II; UDWR SOC; UPIF PS transient, non-breeding

Gray Flycatcher *Empidonax wrightii* UPIF PS transient, non-breeding

Gray Vireo *Vireo vivinoir* UDWR WAP Tier III; UPIF PS resident (summer), likely non-breeder,

Green-tailed Towhee *Pipilo chlorurus* FWS BCC resident (summer), nester

Loggerhead Shrike *Lanius ludovicianus* FWS BCC resident; nester; occurs and persists on DPG testing grids

Long-Billed Curlew *Numenius americanus* UDWR WAP Tier II; UDWR SOC, UPIF PS; FWS BCC declining population, limited distribution, most likely transient, no known nesting

Marbled Godwit *Limosa fedoa* FWS BCC non-breeding in Great Basin; transient (spring), non-breeder

Mountain Plover *Charadrius montanus* UDWR WAP Tier III; UDWR SOC, UPIF PS transient (spring and fall), non-breeder

Northern Goshawk *Accipiter gentilis* UDWR WAP Tier I; UDWR Conservation Agreement Species transient (spring, fall), non-breeding

Osprey *Pandion haliaetus* UDWR Tier III transient (spring, fall), non-breeding; seen on DPG 9/2008

Peregrine Falcon *Falco peregrinus* UDWR Tier III; FWS BCC transient (spring and fall), resident (summer), nester; one breeding pair located during 2011 surveys

Pinyon Jay *Gymnorhinus cyanocephalus* FWS BCC vagrant; non-breeding

Sage Sparrow *Amphispiza nevadescens* UDWR Tier III; UPIF PS; FWS BCC common, resident (summer), nester

Sage Thrasher *Oreoscoptes montanus* UDWR Tier III; FWS BCC resident (summer), nester

Short-Eared Owl *Asio flammeus* UDWR WAP Tier II; UDWR SOC declining population, uncommon nester (one nest found 2006)

Snowy Plover *Charadrius alexandrinus* UDWR WAP Tier III; FWS BCC resident (summer), nester; USFWS and DPG completed randomized surveys in May/June 2008 for this species on the DPG playa; BYU and DPG completed surveys in 2011 and 2012, and plan to continue surveys; found only in area bordering USFWS Fish Springs National Wildlife Refuge

Willow Flycatcher *Empidonax traillii* FWS BCC non-listed related species of Endangered species (Southwestern Willow Flycatcher - sub-species); transient, non-breeding

Virginia's Warbler *Vermivora virginiae* UDWR WAP Tier III; UPIF PS; FWS BCC uncommon, transient (spring /fall), unlikely nester

MAMMALS

Dark Kangaroo Mouse *Microdipodops megacephalus* UDWR WAP Tier II; UDWR SOC declining population, limited distribution, historical use of DPG, no current records.

Fringed Myotis *Myotis thysanodes* UDWR WAP Tier II; UDWR SOC uncommon, limited information available on distribution; known to occur near DPG (within 10 KM); no records on DPG; not recorded during 2009, 2011, or 2012 mist net surveys; acoustic surveys have not been analyzed yet.

Kit Fox *Vulpes macrotis* UDWR WAP Tier II; UDWR SOC declining population known on DPG, limited distribution, breeding, high coyote predation .

Pygmy Rabbit *Brachylagus idahoensis* ESA Endangered Columbia Basin DPS; ESA Petitions in Region 1 (to include Utah's West Desert); UDWR WAP Tier II; UDWR SOC 90-day finding by USFWS under ESA found listing may be warranted (08 January 2008, 73 FR 1312 1313); 12 month finding past due in January 2009; surveys were completed on DPG in 2012 and neither individuals nor any sign of presence was found to occur in Tooele County.

Utah Townsend's Big-Eared Bat *Corynorhinus townsendii* UDWR WAP Tier II; UDWR SOC declining population, limited distribution, roosts and waters at DPG mines during winter and summer, breeding (sub-adults present on DPG 2009)

PLANTS

Dwarf Spring Parsley *Cymopterus acaulis* var. *parvus* BLM RPS, NatureServe: N2N3, S2S3, UNPS RPL W found at 7 locations on DPG in 2007 and 2008 surveys.

Fathers Penstemon *Penstemon leonardii* var. *patricus* NHP RPS; Nature Serve: N2, S2 3 locations identified on DPG in 2008 surveys.

Giant Four-wing Saltbrush *Atriplex canescens* var. *gigantea* NatureServe: N1; S1; UNPS RPL ExH genetic analysis confirmed the presence of this rare plant on DPG in 2008.

Giant Helleborine *Epipactis gigantea* NatureServe: N3N4, S3S4, UNPS RPL rare, detected at 1 location on DPG in a 2007 survey.

Pohl's Milkvetch *Astragalus lentiginosus* var. *pohlii* BLM RPS; NatureServe: N1, S1; UNPS RPL detected at 10 locations (94 plants) on DPG in 2007 & 2008 surveys.

REPTILES and AMPHIBIANS

Long-nosed Leopard Lizard *Gambelia wislizenii* UDWR WAP Tier III reptile study in 2008 detected 25 times at 5 sites; present at development of TTPs and non-development of TTPs areas; breeding (juveniles present)

Long-nosed Snake *Rhinocheilus lecontei* UDWR WAP Tier III uncommon, limited information, reptile study in 2008 detected species 4 times at 4 different sites (2 in military development of TTPs areas); breeding status unknown

Nightsnake *Hypsiglena torquata* UDWR WAP Tier III uncommon, limited information; reptile study in 2008 identified only 1 individual

Western Skink *Eumeces skiltonianus* UDWR WAP Tier III only the sub-species *E.s. utahensis* has been identified on DPG; no recent records however; not detected in the 2008 reptile study though no survey sites were located near water

MOLLUSKS

Several Mollusk species exist on the UDWR WAP Tiered list as well as the UDWR SOC list.

DEFINITIONS/KEY

NHP RPS: Morefield, J. D. (editor). 2001. Nevada Rare Plant Atlas. Carson City: Nevada Natural Heritage Program, compiled for the US Department of Interior, Fish and Wildlife Service, Portland, Oregon and Reno, Nevada. Online at: <http://heritage.nv.gov/atlas/atlastxt.pdf> (pg viii) and <http://heritage.nv.gov/atlas/atlas.html>

UNPS RPL: Utah Native Plant Society. 2003-2008. Utah Rare Plant Guide. Salt Lake City, UT: Utah Rare Plant Guide Home Page. <http://www.utahrareplants.org>. Threatened, Endangered, and Species-at-Risk List for US Army Dugway Proving Ground (DPG), Dugway, Utah 84022 (updated 01 September 2009)

UPIF PS: Utah Partners in Flight Avian Conservation Strategy Version 2.0. UDWR Publication Number 02-27. December 2002. Utah Partners in Flight Priority Species: http://wildlife.utah.gov/publications/pdf/utah_partners_in_flight.pdf (8MB). Pg 52.

FWS BCC: US Fish and Wildlife Service (USFWS). December 2008. Birds of Conservation Concern (BCC) 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Online version available at <http://www.fws.gov/migratorybirds/>; http://library.fws.gov/Bird_Publications/BCC2008.pdf (1MB). List pg 25.

UDWR WAP: Gorrell, Janet V et al. 9 September 2005. Utah Comprehensive Wildlife Conservation Strategy. Utah Division of Wildlife Resources. Online at: http://wildlife.utah.gov/cwcs/utah_cwcs_strategy.pdf (36 MB). Pgs 5-3 to 5-8.

BLM RPS: Bureau of Land Management Sensitive Plant Species List for Utah. August 2004. Online at: <http://www.unps.org/miscpdf/blmspslAug2002.pdf>.

ESA Listing: Endangered, Threatened, Proposed, and Candidate Species Utah Counties. March 2009. Online at: <http://www.fws.gov/mountain-prairie/endspp/CountyLists/Utah.pdf>. Current ESA Listing Actions; 01 September 2009. Online at: <http://www.fws.gov/Endangered/wildlife.html>.

***ESA** - Endangered Species Act; **UDWR WAP Tier I, II, or III** - Utah Division of Wildlife Resources Wildlife Action Plan *Tier I* (Greatest Conservation Need, Includes ESA Listed and Candidate Species among others), *Tier II* (Intermediate Conservation Need, Includes UDWR Species of Concern), or *Tier III* (Conservation Concern; Often Requires More Information to Determine Conservation Need); **UDWR SOC** - Utah Division of Wildlife Resources Wildlife Species of Concern; **UPIF PS** - Utah Partners in Flight Priority Species; **FWS BCC** - US Fish and Wildlife Service Birds of Conservation Concern; **BLM RPS** - Bureau of Land Management Rare Plant Species. **NatureServe N1-4, S1-4** - National (N) and State (S) rankings 1-5; 1 = Critically Imperiled, 2 = Imperiled, 3 =Vulnerable, 4 =Apparently Secure, and 5 =Secure.

NHP RPS - Nevada Heritage Program Rare Plant Species. **UNPS RPL W and ExH:** Utah Native Plant Society Rare Plant List, Priority *ExH* = Extremely High, Priority *W* = Watch.

NatureServe: Nature Serve Explorer. Conservation Status. Accessed 29 August 2009. Online at: <http://www.natureserve.org/explorer/ranking.htm>

UDWR SOC: Utah Division of Wildlife Resources Utah Sensitive Species List. 14 December 2007. Online at: <http://dwrcdc.nr.utah.gov/ucdc/ViewReports/SSL121407.pdf> (1MB).

*UDWR – Utah Division of Wildlife Resources, UPIF – Utah Partners in Flight, USFWS – US Fish and Wildlife Service, BLM – US Bureau of Land Management, UCAS – Utah Conservation Agreement Species

SPECIES NOT KNOWN TO BE PRESENT ON DPG, BUT MAY BE NEAR DPG

BIRDS

Greater Sage Grouse *Centrocercus urophasianus* ESA Candidate/Under Review in Select Regions; UDWR WAP Tier II; UDWR SOC, UPIF PS; FWS BCC possible resident, no DPG record, known close to DPG, unknown nester; ESA Candidate species in portion of Region 1 (not Utah Great Basin); ESA species under review in Regions 6 and 8 (does not include Great Basin area). Not known to occur on DPG.

Yellow-billed Cuckoo (w. U.S. DPS). The Yellow-billed Cuckoo is not known to inhabit DPG. DPG Natural Resources personnel are alert to these species and would apply avoidance, minimization, and mitigation measures and actions to protect and conserve these species should they be encountered on DPG. Not known to occur on DPG.

FISH

Least Chub *Lotichthys phlegethontis* UDWR WAP Tier I, UDWR Conservation Agreement Species petitioned to list under ESA and founded warranted in 1995; listing proposal was withdrawn in 1999 due to interagency cooperation and the completion of a Conservation Agreement and Strategy. Species is known only to occur at 5 locations, three of which are in Snake Valley (Leland Harris Springs, Gandy Salt Marsh, and Bishop Springs). Historically the least chub occupied Callao Springs and Redden Springs (Crist 1990). Not known to occur on DPG.

REPTILES

Northern Leopard Frog *Rana pipiens* ESA Petitioned; UDWR WAP Tier III 90-day finding by USFWS under ESA found listing may be warranted (1 July 2009, 74 FR 3138931401); 12 month finding due in 2010; not known to occur at DPG; not found during the 2008 reptile/amphibian survey though no sites were near water; none have been seen during bat surveys on or near DPG in 2009. Not known to occur on DPG.

PLANTS

Ute Ladies' Tresses *Spiranthes diluvialis* ESA Threatened known close to DPG, rare plant surveys completed in 2007 & 2008 did not find it on DPG. Not known to occur on DPG.

APPENDIX E. US Fish and Wildlife Service Birds of Conservation Concern in the Great Basin

BCR 9 (Great Basin) BCC 2008 list.

Greater Sage-Grouse (Columbia Basin DPS) ^(a)

Eared Grebe ^(nb)

Bald Eagle ^(b)

Ferruginous Hawk

Golden Eagle

Peregrine Falcon ^(b)

Yellow Rail

Snowy Plover ^(c)

Long-billed Curlew

Marbled Godwit ^(nb)

Yellow-billed Cuckoo (w. US DPS) ^(a)

Flammulated Owl

Black Swift

Calliope Hummingbird

Lewis's Woodpecker

Williamson's Sapsucker

White-headed Woodpecker

Willow Flycatcher ^(c)

Loggerhead Shrike

Pinyon Jay

Sage Thrasher

Virginia's Warbler

Green-tailed Towhee

Brewer's Sparrow

Black-chinned Sparrow

Sage Sparrow

Tricolored Blackbird

Black Rosy-Finch

Notes:

(a) ESA candidate

(b) ESA delisted

(c) non-listed subspecies or population of Threatened or Endangered species

(d) MBTA protection uncertain or lacking

(nb) non-breeding in this BCR

US Fish and Wildlife Service