
4. CUMULATIVE EFFECTS AND OTHER ENVIRONMENTAL CONSIDERATIONS

4.1 CUMULATIVE EFFECTS

4.1.1 Introduction

According to CEQ regulations, the cumulative effects analysis of an EIS should consider the potential environmental impacts resulting from “the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (40 CFR 1508.7).

Cumulative effects may occur when there is a relationship between a proposed action or alternative and other actions expected to occur in a similar location or during a similar time period. This relationship may or may not be obvious. The effects may then be incremental and may result in cumulative impacts. Actions overlapping with or in close proximity to the Proposed Action or alternatives can reasonably be expected to have more potential for cumulative effects on “shared resources” than actions that may be geographically separated. Similarly, actions that coincide in the same timeframe tend to offer a higher potential for cumulative effects.

In this LEIS, the Air Force has made an effort to identify actions on or near the proposed withdrawal areas that are under consideration and in the planning stage at this time. These actions are included in the cumulative effects analysis to the extent that details regarding such actions exist and the actions have a potential to interact with the proposed alternatives outlined in this LEIS. Although the level of detail available for those future actions varies, this approach provides Congress with the most current information to evaluate the consequences of the alternatives. The LEIS addresses cumulative impacts to assess the incremental contribution of the alternatives to impacts on affected resources from all factors.

The analysis first discusses past actions, events, and circumstances that are relevant to the environments associated with the NTTR land withdrawal alternatives. Following is a discussion of other actions that, when combined with military test and training actions and conceptual construction activities, may result in incremental impacts.

4.1.2 Relevant Past and Present Actions

The relevant past and present actions associated with the impacts of the Proposed Action include continued use of the NTTR for military test and training activities, plus nearby development and infrastructure improvements such as roads, pipelines, and power transmission lines. Past and present actions in and around the action areas associated with these activities may have cumulative effects on the local environment.

Nellis Nevada Test and Training Range Wildland Fire Management Plan Final Report. A Wildland Fire Management Plan was prepared for unimproved lands that present a wildfire hazard on the NTTR. Wildland fires pose a significant threat to training missions, weapons testing, structures, infrastructure, and natural and cultural resources on USAFWC lands on the NTTR. In addition, wildfires that start on the NTTR could spread to neighboring private and public lands, threatening homes in the wildland urban interface/intermix and causing damage to natural and cultural resources. Flares used during aerial training activities within the MOAs have the potential for unintentionally igniting a wildland fire on lands within and outside of the NTTR.

The Wildland Fire Management Plan guides the full range of fire management-related activities for the NTTR. As a component of the NTTR INRMP, the Wildland Fire Management Plan provides the framework for fire management, wildland fire suppression, burned area emergency rehabilitation, emergency stabilization, and fuel treatment activities to support the military mission and safely accomplish the resource protection and ecosystem management objectives of the INRMP.

Management of the NTTR is the responsibility of the 99th Air Base Wing (99 ABW) and NTTR personnel working through the USAFWC, which do not have trained or qualified personnel to protect the NTTR from damage or loss by wildland fires. The USAFWC has established an agreement with the DOE that allows each agency to share personnel and assets in fighting brush and range fires. While this agreement is a positive step forward, it must be understood that both agencies have severe limitations on the type and level of support that each can offer at any given time. Nellis AFB and the BLM have signed a Memorandum of Agreement to address each agency's roles and responsibilities for brush and range fires on the NTTR. However, BLM is the primary force for fighting wild land fires on the NTTR.

Fire Management for the Cedar Peak Area on the Nevada Test and Training Range Final Environmental Assessment. Nellis AFB prepared an Environmental Assessment to identify and evaluate potential environmental impacts from the proposed implementation of the NTTR Wildland Fire Management Plan. An important military communications asset is located at the summit of Cedar Peak. To protect this asset from wildland fire, a 300-foot radius (6-acre area) around the asset would be clear-cut and an additional 900-foot radius (96-acre area) would be thinned of trees. Trees would be felled by hand, piled, and burned onsite under winter conditions to limit potential impacts to onsite soils, the canopies of nearby trees, and the military asset of concern.

In addition to outlining fire suppression, fuels management, and rehabilitation techniques, the Wildland Fire Management Plan also discusses routine safety practices, training, and maintenance measures that are currently implemented at the NTTR and consistent with operation and maintenance requirements covered under existing NEPA documentation. These measures and additional administrative components of the Wildland Fire Management Plan may not directly impact existing resources or would not have any further impact if implemented as discussed in the Wildland Fire Management Plan. Adhering to these measures would reduce the potential likelihood of a devastating

wildland fire, decrease the adverse effects caused by a potential wildland fire, and serve as BMPs to reduce potential significant adverse effects, as defined by NEPA.

Three discrete planned fuels reduction projects, as described within the Wildland Fire Management Plan, would reduce the potential risk to high value military assets located across the NTTR. However, only the fuels reduction project planned for Cedar Peak has been completed.

F-35 Force Development Evaluation and Weapons School Beddown, Nellis Air Force Base, Nevada, Final Environmental Impact Statement. In 2011, the Air Force signed a Record of Decision for the F-35 Force Development Evaluation and Weapons School Beddown at Nellis, AFB (U.S. Air Force, 2011) (the “F-35 beddown EIS”). The proposed action involved basing 36 F-35 aircraft at Nellis AFB with 12 aircraft for the Force Development Evaluation program and an additional 24 for Weapons School training.

Arrival of aircraft was based on a phased approach contingent on manufacturing progress and other elements of F-35 deployment; the first aircraft arrived in 2012 and the last is scheduled for 2020. It was anticipated that the additional aircraft would conduct an additional 17,280 annual airfield operations at Nellis AFB by 2020 and an additional 51,840 annual sortie-operations in NTTR. In addition, F-35 pilots would practice ordnance delivery on approved targets and release of flares in approved airspace.

In addition to the planned operations, there will be construction, demolition, or modification of a variety of base facilities to support the F-35 programs, particularly along the flightline. Table 4-1 provides a list of the proposed construction and demolition activities.

Table 4-1. Proposed Construction and Demolition Actions for the F-35 Beddown

Project	Area (square feet)	Base Area	Start Date Year	Demolish Building #
A-10 Thunder Aircraft Maintenance Unit (AMU)	11,000	B	FY11	
6-Bay F-35 Hangar/AMU	80,988	B	FY11	265, 268, 269
Aircraft Washrack Addition, 1-bay to Building 271	9,551	B	FY11	
B10425 Munitions Facility Addition at Building 10425	3,000	MSA	FY11	
25-mm Munitions Storage Facility Addition at M81	3,000	MSA	FY11	
Munitions Trailer Facility	10,000	MSA	FY11	
2 Munitions Storage Area (MSA) Loading Docks	1,000	MSA	FY11	
Precision-Guided Missile Bay Addition at Building 10439	3,000	MSA	FY11	
Parking/landscape Areas	15,656	B	FY11	
Flight Test Instrumentation Facility	4,650	B	FY11	
422 Test Evaluation Squadron Operations Facility	20,300	B	FY11	
Flight Simulator Facility	20,000	B	FY11	
Fiscal Year 2011 (FY11) Subtotal	182,145			
Aerospace Ground Equipment (AGE) Complex	45,000	A	FY12	
Engine Shop Addition	9,000	C	FY12	
53rd Wing Test Squadron Operations Building	20,000	C	FY12	

Table 4-1. Proposed Construction and Demolition Actions for the F-35 Beddown

Project	Area (square feet)	Base Area	Start Date Year	Demolish Building #
FY12 Subtotal	74,000			
Parking/landscape Areas	190,301	B	FY13	
Weapons School Addition at Building 282	10,000	B	FY13	
Alternate Mission Equipment Storage Facility	25,285	A	FY13	
Fuel Cell Hangar Addition	16,300	B	FY13	
Munitions Maintenance Facility Addition	6,000	MSA	FY13	
FY13 Subtotal	247,886			
Weapons Release Building	15,000	B	FY14	441
Parts Store	40,000	B	FY14	413, 415
East Ramp/Airfield Pavement	495,140	D	FY14	
Live Ordnance Loading Area (LOLA) Expansion	167,322	D	FY14	
Bomb Build-Up Pad	30,000	MSA	FY14	
Low Observables (L/O) Composite Addition	11,018	B	FY14	
4-Bay F-35 Hangar/Strike AMU	31,000	B	FY14	258
L/O Corrosion/Wash 3-Bay Hangar	15,800	B	FY14	250
Parking/landscape Areas	96,486	B	FY14	
Fuel Cell Hangar	50,250	B	FY14	
FY14 Subtotal	952,016			
Total	1,572,829			

Goldfield Historic District. The Goldfield Historic District was designated a Historic District and listed in 1982 on the NRHP. It is located in the center of Goldfield, Nevada, in Esmeralda County. The description of the designation includes an area bounded by 5th Street and Miner, Spring, Crystal, and Elliott Avenues. The District contains roughly 200 acres of the unincorporated area and approximately 120 buildings, most dating from the time of Goldfield's initial mining boom from 1904 to 1909. During this timeframe, Goldfield became a regional epicenter during Nevada's 20th century mining boom.

SolarReserve Crescent Dunes Solar Energy Facility. SolarReserve's Crescent Dunes Solar Energy Facility located in Tonopah, Nevada, is a utility-scale facility that offers advanced molten salt power tower energy storage capabilities. The project delivers enough electricity from solar energy to power 75,000 homes in Nevada during peak demand periods, around the clock regardless of weather conditions. The project, which entered into commercial operation in late 2015 and delivers 110 megawatts (MW) of electricity plus 1,100 megawatt-hours of energy storage.

The Crescent Dunes plant is a success story for U.S.-developed technology. The plant produces more than 500,000 megawatt-hours of electricity per year, twice the generation of an equivalent-sized photovoltaics or direct steam solar thermal facility. It also utilizes dry cooling technology in a hybrid design to minimize water use well below conventional power projects. The storage technology developed by SolarReserve also eliminates the need for any backup fossil fuels, such as natural gas, which are needed

1 with other solar technologies to keep the system operating during times of reduced solar
2 resource.

3 During the construction of the plant, the Crescent Dunes project created over
4 4,300 direct, indirect, and induced jobs, with more than 1,000 construction workers
5 onsite during peak construction. Sixty percent of the project subcontractors were
6 Nevada-based, and 40 full-time, permanent jobs for operations and maintenance were
7 created. The project also generated in excess of \$750 million in capital investment in
8 Nevada. Tax revenues are forecasted to be more than \$73 million in local and state tax
9 revenues over first 20 years of operation. During the 30-year operating life, the project
10 will expend more than \$10 million per year in salaries and operating costs, much of this
11 spent in the region.

12 **4.1.3 Reasonably Foreseeable Future Actions**

13 In addition to future Air Force actions, some reasonably foreseeable actions are
14 outside of the control of the Air Force, such as regional development projects that
15 may contribute incrementally to impacts associated with Air Force alternatives
16 addressed in the LEIS. Projects that the Air Force considers of limited scope (e.g.,
17 building of a courthouse annex, improvements to roadways for pedestrians) are not
18 considered cumulatively significant and, therefore, were not included in the cumulative
19 impacts analysis.

20 **Nellis AFB Capital Improvements Program Environmental Assessment.** Nellis AFB
21 proposes to initiate updates to the Capital Improvements Program (CIP) that would
22 include construction, demolition, renovation, and maintenance activities at the base. By
23 taking a comprehensive approach to planning and implementing facilities and
24 infrastructure improvements over a multi-year period, Nellis AFB would ensure that
25 limited funds, energy conservation, and operational goals are maximized. Proposed
26 improvements would comply with the Department of Defense's (DoD's) direction to
27 design and build Leadership in Energy & Environmental Design (LEED®) certified
28 facilities and decrease energy consumption on military installations.

29 The projects described in the CIP are derived from the Base Comprehensive Asset
30 Management Plan (BCAMP). The BCAMP lists all of the proposed projects that have
31 been identified as a true need by the individual proponents of each action. These
32 projects are reviewed by the Civil Engineering Facility Review Board and approved by
33 the 99 ABW Commander based upon factors including mission requirements, quality of
34 life, degradation of existing facilities, etc. While the CIP includes hundreds of projects,
35 funding for all of the projects to be completed in the next five years is not feasible
36 because of the limited amount of funds available. These funding limitations are due to
37 worldwide deployments and contingency operations, competing funding requests from
38 every other military installation, new missions such as the F-35A beddown, and general
39 budget reductions for civil engineering projects. As a result, only a small percentage of
40 the projects can be funded within one fiscal year. In addition to the proposed action, the
41 Air Force analyzed the no-action alternative.

Since the overall funding amount available to execute CIP projects is unknown, two construction scenarios were developed to place reasonable limits on the analysis. Scenario 1 involves light construction and describes demolition of an unspecified 2,000-square-foot existing building and construction of representative 30,000-square-foot facility, including parking up to 3 acres. The vast majority of the CIP projects combined together would be an aggregate size less than that described for Scenario 1. Scenario 2 triples the size of the demolition and construction up to 10 acres; only the largest or combination of several smaller new construction projects would reach this limit. Other large projects could be implemented if aspects of Scenario 2 would not be implemented, such as roadway projects where there would be no demolition or facility construction, but would be looked at on a case-by-case basis.

Creech AFB Capital Improvements Program Environmental Assessment. Creech AFB has proposed to formally update their CIP, which continually evolves, but the last formal proposal that resulted in NEPA documentation was during the 2008 update of the Creech AFB General Plan. The mission changes at Creech AFB are substantive enough to require an update of the CIP projects list. Restoration/Modernization and Sustainment projects would provide the base with up-to-date facilities by repairing, remodeling, or replacing older facilities to modern standards. Also, these outdated facilities demand considerable energy, and replacing them with new energy-efficient, updated facilities would yield considerable savings for the base and would conform to DoD guidelines for LEED® facilities.

The projects described in the CIP are derived from Creech AFB's BCAMP, which lists all of the proposed projects that have been identified as a true need by the individual proponents of each action. Like the Nellis AFB CIP projects, these projects are reviewed by the Civil Engineering Facility Review Board and approved by the 99 ABW Commander based upon factors including mission requirements, quality of life, degradation of existing facilities, etc. Due to the funding uncertainties that drove the analysis in the previously described Nellis AFB CIP Environmental Assessment, the Creech AFB CIP Environmental Assessment also evaluated two Scenarios: Scenario 1 includes light construction plus demolition of an unspecified 2,000-square-foot existing building and construction of representative 30,000-square-foot facility, including parking up to 3 acres, and Scenario 2 triples the size of the demolition and construction up to 10 acres.

The Air Force also analyzed the no-action alternative. Baseline conditions as reflected by the no-action alternative provide a comparison to the environmental impacts of the proposed action.

Mountain Bike Trails, City of Beatty, Nye County. Mountain biking activities continue to be developed north and west of Beatty, Nevada, which lies to the southwest of the NTTR. Figure 4-1 displays some of the existing (shown as green lines) and proposed trails (red lines). A non-profit corporation, STORM-OV (Saving Toads thru Off-Road Racing, Ranching and Mining in Oasis Valley) was formed to create 300 to 500 miles of off-road, multi-use trails for mountain biking, hiking running and horseback. Its plans are for the trails to eventually link Beatty to Death Valley, Rhyolite, and other regional

trails. The trails would run through federal lands and private lands whose owners are willing to grant permission for its use for the trails. According to the Regional Director of the International Mountain Biking Association, the trails could bring \$25 million to \$42 million to the Beatty area (Pahrump Valley Times, 2015).

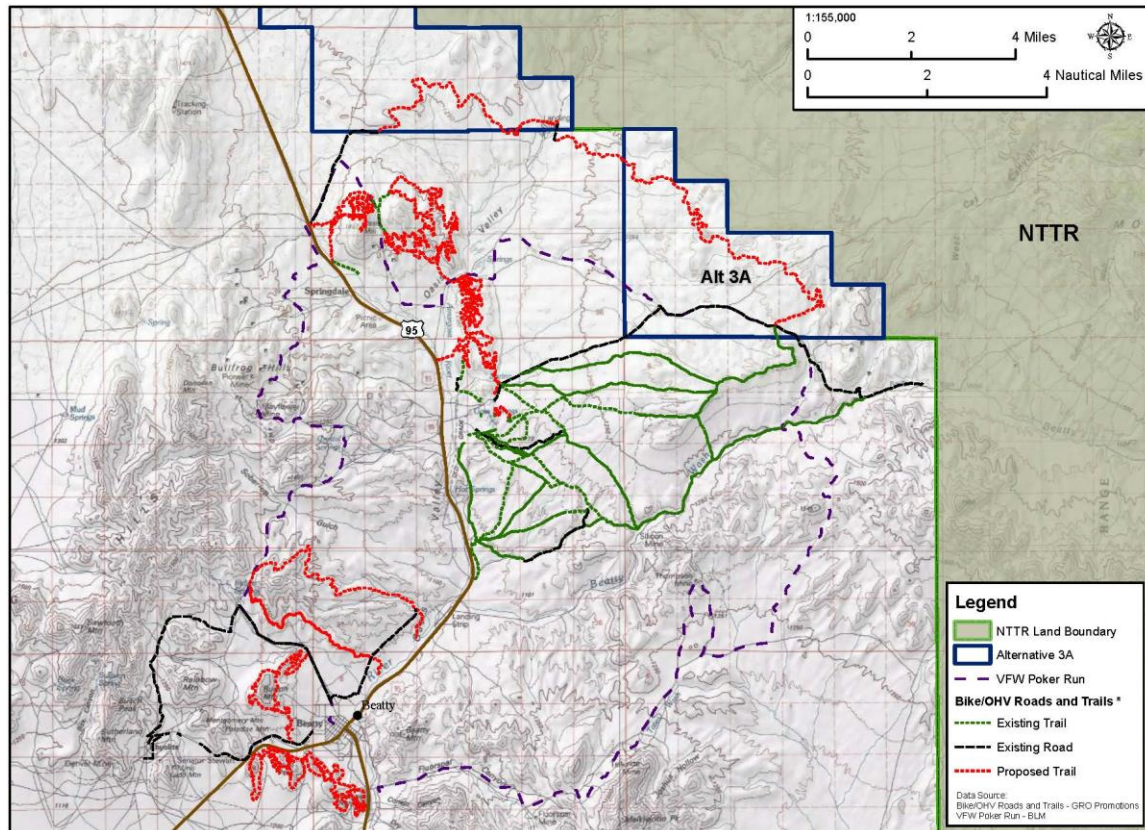


Figure 4-1. Existing and Proposed Mountain Bike Trails in the Beatty, Nevada, Area, 2016
Source: (GRO Trails and Race Consulting, 2016)

Off-Highway Vehicle Trails, Nye County. Recreational activities within the proposed withdrawal area associated with Alternative 3A include but are not limited to hunting, hiking, camping, bird-watching, target shooting, and OHV activities. As of April 2017, there are no restrictions on target shooting, with the exception of the standard guidelines (no glass targets, 1,000 feet from roads and houses, etc.). Public lands not closed to OHV usage are commonly limited to existing roads, trails, and dry washes, with the exception of dry lakes, which are open to all OHV activities. Recreation areas are further limited to designated roads and trails (U.S. Air Force, 2017a). The Oasis Valley and Oasis Mountain areas northeast of Beatty and directly adjacent to the NTTR are popular areas for hiking, mountain biking, and OHV activities. A few of the primary users include: Trails-OV (www.trails-ov.org), which helps to develop, promote and maintain a series of trail systems for mountain biking, trail running, equestrian use and rock climbing including the Spicer Ranch Trail System and Transvaal Flats Trail System; Beatty VFW (www.beattyvfw.com), which holds Jeep/4-wheel drive vehicle events like the “Run Through the Desert” Fun Day and the Annual Bullfrog Historical

1 Mining District Poker Run; and Best in the Desert Racing Association (www.bitd.com)
2 “Vegas to Reno” off-road race.

3 Proposed bike trails are in the early stages of planning with the BLM office in Tonopah.

4 **Coyote Springs Nevada LLC, Lincoln County.** Coyote Springs Nevada LLC (CSN)
5 acquired the former Aerojet Nevada lands on the Clark County line along U.S. Highway
6 93. CSN owns an estimated 42,000 acres in the area. A development agreement and
7 planned development code was approved by Lincoln County in June 2005 for these
8 lands. A density of 5 units per acre was approved by the county. Development has
9 commenced on the Clark County side of this project. CSN is proposing to develop a
10 “new community” to include various forms of housing, golf courses, commercial centers
11 and industrial sites. This “new community” would include 42,000 acres and has
12 completed their Multi-Habitat Species Plan in both Clark and Lincoln Counties. CSN is
13 competing construction on a wastewater treatment plant as well as a water treatment
14 plant. This proposal will be implemented through a planned unit development of
15 159,600 units. Offsite flood control detention basins will be completed in 2017 and
16 homes are anticipated for sale in early 2018.

17 **Lincoln County Industrial Park.** In the Alamo, Nevada, area, Lincoln County is
18 expecting a direct sale of public lands from BLM for 217 acres to develop an industrial
19 park along U.S. Highway 93 south of Alamo. A production well has been drilled on the
20 site and pump-tested. Ample water of high quality is available at the site. Design
21 engineering studies have been completed, and the site is awaiting disposal by
22 sale/auction through BLM in the spring of 2007. Studies are also underway to provide
23 the site with power and other utilities.

24 **Solar Reserves Sandstone Project.** The Sandstone project will be a solar power plant
25 complex with up to 10 solar thermal towers, with a 24-hours-per-day, seven-days-per-
26 week baseload solar technology. Each tower will be 150 to 200 MW, with storage and
27 fully dispatchable, each producing about 700,000 megawatt-hours per year. Multiplying
28 the 10 towers’ baseload will provide up to 2,000 MW of total power capacity and
29 7,000,000 megawatt-hours of annual output. Each tower will have approximately
30 10 hours of full-load energy storage, totaling 20,000 megawatt-hours of energy storage
31 capability for the entire project. Sandstone will be built in Nye County, Nevada.

32 **Pahrump Valley Desert Tortoise Habitat Conservation Plan.** Nye County is
33 proposing a Pahrump Valley Desert Tortoise Habitat Conservation Plan (HCP) to
34 address the urban development of land within the limits of the Town of Pahrump and
35 adjacent lands designated for disposal and sale by the BLM (Nye County Planning
36 Department, 2009). The scope, or Permit Area, of this plan is 92,489 acres and includes
37 the private land in Pahrump and 6,022 acres of public land administered by BLM and
38 identified for disposal. The HCP estimates that up to 1,000 acres of desert tortoise
39 habitat may be lost as a result of urban development within the Permit Area over the
40 next 10 years. The HCP has been prepared to support an application for a Section
41 10(a)(1)(B) Incidental Take Permit (Permit) under the federal ESA for the incidental take
42 of the desert tortoise, a species listed as threatened under the ESA on 1,000 acres of
43 private land or BLM disposal lands, upon transfer of ownership to a non-federal entity, in
44 the Pahrump Regional Planning District (i.e., the Planning Area). The request for the

1 incidental take of desert tortoises is based on tortoise surveys conducted by the BLM,
2 Nye County, private land owners and others that indicate tortoises occur in relatively low
3 densities in the Planning Area. The HCP is intended to support the issuance, by the
4 USFWS of a Section 10(a)(1)(B) incidental take permit under the ESA, which would
5 allow the “take” of the threatened desert tortoise resulting from otherwise lawful
6 activities on non-federal property within the Planning Area. Subsequent to the issuance
7 of a permit, the Pahrump Valley Desert Tortoise HCP will be implemented to minimize,
8 mitigate, and monitor the impacts of incidental take of desert tortoise.

9 **Clark, Lincoln, and White Pine Counties Groundwater Development Project.** The
10 Southern Nevada Water Authority submitted a right-of-way application to the BLM for
11 construction and operation of a groundwater development project that would allow them
12 to develop and transport water from Clark, Lincoln, and White Pine Counties to southern
13 Nevada. The proposed project consists of approximately 306 miles of buried pipelines,
14 five pumping stations, six regulating tanks, three pressure reducing stations, one buried
15 storage reservoir, one water treatment facility, and approximately 323 miles of power
16 lines with seven electrical substations. Construction is anticipated to take place between
17 2011 and 2022, depending on approvals and phasing.

18 **Lincoln County Land Act Groundwater and Utility Right-of-Way Project.** The
19 Lincoln County Water District submitted a right-of-way application to the BLM for
20 construction and operation of a groundwater development project. The right-of-way
21 would authorize the Lincoln County Water District to construct infrastructure required to
22 pump and convey groundwater resources in the Tule Desert and Clover Valley to help
23 meet future municipal water needs in newly urbanizing areas. The proposed project
24 consists of a 47-mile main transmission pipeline and 54 miles of collection/lateral
25 pipelines, up to 30 production wells, water storage tanks, booster stations, access
26 roads, 138-kilovolt (kV), 22.8-kV, and 4.16-kV transmission lines, a power substation, a
27 natural gas pipeline, underground telephone lines and a telemetry system utilizing a
28 fiber optic line. Construction would begin upon acquisition of necessary permits,
29 approvals, and grants.

30 **Kane Springs Valley Groundwater Development Project.** The Lincoln County Water
31 District submitted a right-of-way application to the BLM for construction and operation of
32 a groundwater development project that would authorize the District to construct
33 infrastructure required to pump and convey groundwater resources in the Kane Springs
34 Valley. The proposed project consists of groundwater production and monitoring wells,
35 water collection pipelines, one main water transmission pipeline, one terminal storage
36 tank, one forebay storage tank, electrical distribution lines, electrical substations, and a
37 telemetry system using fiber optic lines. Project construction would occur in three
38 phases with one to three years between phases. Construction of Phase 1 would begin
39 upon acquisition of necessary permits, approvals, and grants.

40 **Section 368 Utility Corridor 18-224.** On August 8, 2005, the President signed the
41 *Energy Policy Act of 2005* (P.L. 109-58) into law. Section 368 directed the Secretaries
42 of Agriculture, Commerce, Defense, Energy, and the Interior to designate corridors for
43 oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on
44 federal lands in the 11 contiguous western states. Congress also directed the agencies

to perform any environmental reviews that may be required to complete the designation of the corridors and incorporate the corridors into land use plans.

On January 14, 2009, the DOI approved a Record of Decision to designate approximately 5,000 miles of corridors which included amendments to 92 land use plans in 11 western states. The USFS issued a Record of Decision on January 14, 2009, which amended 38 national forest land management plans and designated approximately 990 miles of corridors in 10 states. The Decisions included Interagency Operating Procedures, or BMPs, for the Section 368 corridors. The Interagency Operating Procedures can be found on BLM's website. The BLM and USFS decisions relied upon the analysis in the *Final Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386) (PEIS), issued by the DOE, BLM, USFS, and DoD in 2008.

Corridor 18-224 extends northwest-southeast from east of Carson City to northwest of the Town of Pahrump in southern Nye County, Nevada (Figure 4-2).

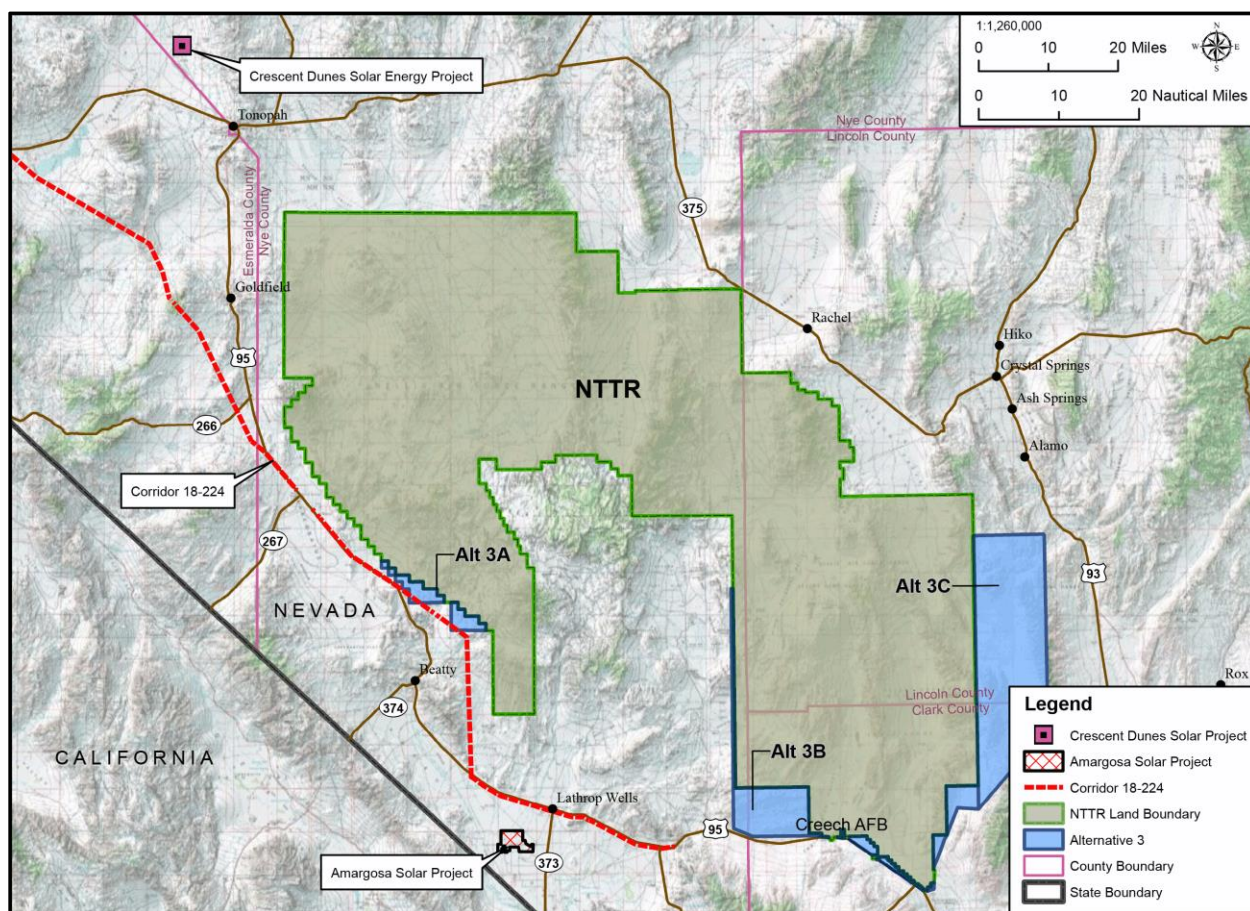


Figure 4-2. Utility Corridor 18-224

Federally designated portions of this corridor are entirely on BLM-administered land, with a 10,560-foot-wide section from Milepost (MP) 0 to MP 89.0 for 83.6 miles and a 3,500-foot-wide section for 161.8 miles from MP 89.0 to MP 256.2. It is designated as a multi-modal corridor that can accommodate both electrical transmission and pipeline

1 projects. The corridor spans a 256.2-mile distance, with 244.2 designated centerline
2 miles. The designated area is 171,986 acres (269 square miles). This corridor is within
3 Mineral, Esmerelda, and Nye Counties in Nevada and within the jurisdiction of BLM's
4 Battle Mountain, Carson City, and Southern Nevada District Offices. While the majority
5 of this corridor is in Priority Region 5, the focus of this review is Priority Region 1, which
6 encompasses the extent of MP 215.7 (approximately 8 miles southeast of Beatty,
7 Nevada) to MP 256.2 (approximately 10 miles north of Pahrump) in southern Nye
8 County within the Southern Nevada District Office.

9 **Standup and Beddown of a Tactical Air Support Squadron, Nellis Air Force Base,**
10 **Nevada.** The Air Force proposes to stand up the Tactical Air Support Squadron (TASS)
11 at Nellis AFB (U.S. Air Force, 2017o). The new TASS would be an integral element of
12 the CAS Integration Group (CIG), and would be integrated into the existing 57th
13 Operations Group at Nellis AFB. The action would transfer/assign up to 16 Fourth
14 Generation F-16C aircraft (14 Primary Aircraft Inventory and two Backup Aircraft
15 Inventory) to the TASS.

16 Personnel at Nellis AFB would increase by a total of 123 Air Force and government
17 support positions and 170 contract maintenance positions. The 123 positions include
18 billets for the TASS, minor additions to the CIG Staff, munitions personnel, and base
19 operating support personnel. All contract maintenance personnel would arrive by the
20 end of fiscal year 2018; of the 123 government personnel, 57 would be expected to
21 arrive in fiscal year 2018 and the remainder the following year. Several military
22 construction (MILCON) and operations and maintenance (O&M) projects would be
23 required to support the beddown.

24 The east side of the existing ramp space would be expanded by approximately
25 11.5 acres to accommodate aircraft displaced by the 16 F-16s, which will be parked on
26 the west ramp. The live ordnance loading area (LOLA) would also be expanded by
27 approximately 7 acres. A new 9,225- square-foot support facility at the LOLA would be
28 constructed. These actions would also require that the existing O'Bannon Road be
29 relocated to accommodate the apron and LOLA expansions. The TASS/CIG HQ would
30 be a new 27,300-square-foot building and would be constructed adjacent to Freedom
31 Park on the west side of the airfield. A new maintenance hangar and Aircraft
32 Maintenance Unit (AMU) facility would require demolition of Building 295 and new
33 construction on-site. The new Maintenance Hangar/AMU would be 55,000 square feet.

34 These projects would be expected to require 12 to 18 months to complete and would be
35 phased over a four-year period beginning with the O&M projects in late calendar year
36 2017. Approximately 20 to 50 construction personnel would be on-site during the
37 construction period, particularly during the peak construction action when concrete is
38 being delivered.

39 The TASS, when fully operational, would be expected to fly approximately 2,700 annual
40 sorties as part of the CAS training mission. Of these, about 300 (or approximately
41 11 percent) are expected to be flown at night between 10:00 PM and 7:00 AM. The
42 aircraft would depart Nellis AFB and transit to the NTTR using restricted airspace
43 (R-2508) and the NTTR MOAs.

Aircraft carrying live munitions always depart to the north, away from downtown Las Vegas. Use of the NTTR is accomplished by an internal scheduling and prioritization of requests within Nellis AFB and Creech AFB user groups; numerous requests for range time result in intense competition for NTTR land and airspace. NTTR test and training schedule blocks are managed to 15-minute intervals for each airspace and range area to ensure efficiency. TASS operations would represent only a negligible increase, but would exacerbate the existing conditions, requiring even further coordination.

4.1.4 Cumulative Effects Analysis

Cumulative effects are assessed for each of the resources presented in Chapter 3. For this analysis, the past, present, and future actions would be the sum of all the activities associated with the Proposed Action, the No Action Alternative, and the other actions described in this chapter.

For the Native American perspective on information in this section, please see Appendix K, paragraph 4.1.4.

4.1.4.1 Airspace Use and Management

With the exception of the addition of the F-35 to Nellis AFB, none of the past, present, or reasonably foreseeable projects identified in Section 4.1.2 and Section 4.1.3 would affect airspace utilization. For any of the proposed alternatives, there are no proposed physical changes (external boundaries, dimensions, altitudes, etc.) to any airspace currently controlled by the NATCF. As such, any changes will be limited to how the airspace is used, particularly with introduction of the F-35. Although additional airspace is not required, certain airspace may be utilized more extensively, while use of other airspace units may decrease. Therefore, the utilization of the current airspace would likely be modified. The result could potentially change the noise levels, patterns, and dispersal over how it is currently used. (See Section 4.1.4.2, Noise, for more details on potential cumulative noise impacts.) Changes in utilization of the airspace could potentially change the air quality within the affected airspace (See Section 4.1.4.3, Air Quality, for more details on potential cumulative air quality impacts.)

4.1.4.2 Noise

Cumulative noise impacts consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2 and Section 4.1.3. Potential cumulative effects of noise on the surrounding communities, wildlife, and cultural resources would be associated with construction and other noise-generating activities, operation of new facilities, and increased aircraft, munitions, and vehicle use.

Several projects would involve construction of Air Force facilities, housing, industrial facilities, and recreational areas. In addition, noise could be generated during fire management activities, installation of a solar energy project, and placement of pipeline and other infrastructure related to groundwater and utility projects (including Utility Corridor 18-224 and Corridor 223-224).

1 The majority of the relevant past and present actions considered as part of the
2 cumulative impacts in Section 4.1.2 and Section 4.1.3 involve construction of a new
3 facility or demolition or renovation of an existing facility. Construction noise is
4 temporary, lasting only for the duration of the construction project, and is typically
5 limited to normal working hours (7:00 AM to 5:00 PM). However, construction noise would
6 be noticeable to persons living and working nearby and may cause additional
7 annoyance. Noise impacts associated with these projects are expected to be limited to
8 the immediate areas surrounding the individual projects and would be insignificant both
9 separately and cumulatively.

10 For Alternative 1, operations and, therefore, noise levels would remain at existing
11 baseline levels, which have existed for many years or even decades. For Alternatives 2
12 and 3, subsonic and supersonic aircraft noise levels, as well as munitions use, troop
13 movement, and emitter functions, would increase very slightly (typically less than 1 dB),
14 and these levels are not likely to be considered by the public to be adverse. Cumulative
15 impacts would occur wherever noise impacts from proposed increased NTTR activities
16 overlap with noise impacts resulting from other reasonably foreseeable actions planned
17 to occur in the NTTR region.

18 Other past, present, and reasonably foreseeable projects may also have associated
19 long-term noise, such as operational noise from an industrial facility, aircraft, munitions,
20 or increased transportation. For capital improvement projects and other military projects
21 at Nellis AFB, Creech AFB, and NTTR, the AICUZ program would influence project
22 planning and implementation by providing data and land use recommendations to
23 ensure public safety, health and welfare, while still supporting the Air Force's mission of
24 national defense. These data are also intended for use by local citizens and
25 governmental officials involved in land use planning and community development and
26 would help guide appropriate implementation of other regional projects in order to
27 ensure land use compatibility and minimize cumulative effects on sensitive receptors
28 and the surrounding communities overall. Because of the incremental nature of the
29 noise impacts associated with the Proposed Action and through application of
30 appropriate planning measures, implementation of the Proposed Action and other past,
31 present, and future actions is unlikely to result in significant noise impacts.

32 **4.1.4.3 Air Quality**

33 Cumulative effects to air quality consist of the combined potential effects resulting from
34 the Proposed Action and applicable past, present, and reasonably foreseeable future
35 projects described in Section 4.1.2 and Section 4.1.3. These projects would result in
36 direct emissions of criteria pollutants and GHGs. Potential cumulative effects to air
37 quality would be associated with combustion of fossil fuels during construction,
38 transportation, operation of new facilities, and increased groundwater use.

39 Several projects including those in the Nellis AFB and Creech AFB CIPs would involve
40 construction of Air Force facilities, housing, industrial facilities, and recreational areas.
41 In addition, air emissions would result from fire management activities, installation of a
42 solar energy project, and placement of pipeline and other infrastructure. For some of

these projects, air emissions would cease once the initial construction phase is complete, such as the groundwater and utility corridor projects. Others, such as housing development projects, would result in minimal increased long-term emissions, such as those associated with residential heating and transportation. Projects such as the solar energy projects would have a large beneficial impact on regional air quality through reduction in the need for fossil fuel combustion and other electricity-generating processes associated with criteria pollutant and GHG emissions. Likewise, many of the Air Force capital improvement program projects at Nellis AFB and Creech AFB would replace outdated, inefficient facilities with modern LEED-certified facilities, which would also likely have a net beneficial impact in the long term. Further, any projects that would include larger emissions-generating sources would be subject to permitting requirements under NSR/PSD and/or Title V Air Construction or Air Operation permits. With implementation of permit requirements and appropriate management practices, the cumulative amount of emissions resulting from the Proposed Action and other past, present, and future actions is unlikely to significantly affect regional air quality.

Table 4-2 provides estimated annual air emissions for projects described in Sections 4.1.2 and 4.1.3 for which such quantitative estimates were available. For other projects described in those sections, analysis in the appropriate NEPA documentation was qualitative in nature or otherwise unavailable.

Table 4-2. Cumulative Air Emissions

Source	Pollutant (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
NTTR Land Withdrawal (Alts 1, 2, and 3)	1,493.63	4,013.61	1,068.16	824.26	196.94	247.55	767,193
Nellis CIG TASS EA (2019)	19.99	-25.04	-3.26	-3.65	0.01	-3.68	225
Creech CIP EA (Scenario 2)	8.5	20.8	66.53	7.53	0.35	1.35	1,844
Nellis CIP EA (Scenario 2)	8.5	20.8	66.53	7.53	0.35	1.35	1,844
F-35 Force Development EIS (2019)	114.83	164.09	45.34	43.99	8.41	8.86	107,929
Amargosa Farm Road Solar EIS (Construction)	149.00	138.40	54.50	15.40	0.37	19.6	-
Coyote Springs Initiative Vehicle Traffic (year 10)	2,084.00	275.00	453.00	90.00	3.00	201.00	-
Crescent Dunes Solar Energy Project EIS (Construction)	38.30	44.50	39.00	39.00	1.45	7.10	9,496
Crescent Dunes Solar Energy Project EIS (Operation)	3.26	2.97	7.57	7.57	0.01	0.22	942

Table 4-2. Cumulative Air Emissions

Source	Pollutant (tons/year)						
	CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOC	CO ₂ e
TOTAL (Proposed Action plus past, present, and foreseeable project emissions)	3,920.01	4,655.13	1,797.37	1,031.63	210.89	483.35	889,473
ROI Baseline	398,567	53,433	69,705	17,576	7,417	501,115	12,179,548
Percent of ROI	0.98%	8.71%	2.58%	5.87%	2.84%	0.10%	7.30%

In totaling all of these projects along with implementation of the NTTR land withdrawal extension or expansion to include Alternatives 1, 2, and 3 such that all potential areas are withdrawn and a 30 percent increase in operational intensity is implemented, annual air emissions are still not shown to exceed 10 percent of the annual ROI emissions. It should be noted that these emissions are not cumulative in this manner in reality. Emissions are affected by many climatological forces such that pollutants are dispersed and broken down by natural processes. However, any quantitative regional air quality dispersion and concentration study to include all federal, state, municipal, and private activities that contribute to regional air quality would be a multi-year, multi-million dollar effort and is well beyond the intent of the NEPA regulation and the scope of this document.

For Alternative 1, the Proposed Action would remain at the current operational levels and would, therefore, not contribute to regional cumulative impacts more than current conditions. For Alternatives 2 and 3, the Proposed Action would incrementally contribute air pollution emissions during construction activities and would allow for increased air pollutant emissions thereafter associated with increased aircraft and munitions operations, troop movements, maintenance, and emitter use. This contribution would relate to regional air quality goals and attainment standards. The contribution from the Proposed Action would be negligible on a regional scale, as construction and demolition impacts are very minor and would be short term, ending when the projects are completed. Aircraft, munitions, troop movement, and emitter emissions would be ongoing and would be a permanent change in annual air emissions. However, the air emissions are expected to have a slight net increase from these ongoing sources of emissions. Air emissions associated with the project represent a small percentage of the Clark, Lincoln, and Nye County annual emissions. Project emissions would not contribute to other county emissions in any appreciable manner.

As discussed above, air emissions from the majority of past, present, and reasonably foreseeable projects would be temporary, intermittent, and minor, and some would have a net beneficial effect on the overall regional air quality. As a result, the Air Force does not expect long-term adverse cumulative impacts to regional air quality associated with air emissions from the Proposed Action and the relevant past, present, and reasonably foreseeable regional development and other projects. Therefore, ambient air quality standards would not be exceeded by the cumulative impact of project-related emissions and emissions from other past, present, or reasonably foreseeable projects.

4.1.4.4 Land Use

Cumulative impacts to land use (primarily recreational resources) consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2 and Section 4.1.3. Of these projects, only the mountain bike and OHV trails development in Nye County, CSN development, and the Amargosa Farm Road Solar Energy Project would impact recreational use and resources in the area surrounding the NTTR.

For the Native American perspective on information in this section, please see Appendix K, paragraph 4.1.4.4.1.

The Amargosa Farm Road Solar Energy Project (approximately 6,320 acres) along with the Proposed Action Alternatives 3A, 3B, and 3C (approximately 300,000 acres) would result in additional access restrictions to currently accessible lands and the cumulative loss of recreational opportunities. Recreational activities were reduced when the CSN lands were transferred from public lands to private lands in the 1980s, and additional development could prevent access of OHV vehicles from CSN private lands to adjacent BLM lands to the east. However, existing (golf course) and planned recreational facilities, such as an amusement park, parks, sports fields, and planned trails could open up a limited amount of new recreational space to the public.

The existing and planned mountain biking and OHV trail system being developed in Nye County in the Oasis Valley area also provide additional recreational opportunities on private and BLM-managed lands. However, portions of the existing (about 4.5 miles) and planned (14.7 miles) bike/OHV trail system would be impacted by the Alternative 3A withdrawal. Under Alternative 3A-1 the potential impact to the existing and planned trails would not occur. Also, over the next five years, Trails-OV plans to develop up to 300 miles of trails and usable routes in the Oasis Valley area (www.trails-ov.org).

It is possible that the loss of existing recreational opportunities from the Alternative 3A, 3B, and 3C withdrawals could result in the increased use of adjacent and nearby recreational areas including other wilderness areas. Many of the recreational areas within the DNWR would remain open and overall visitation would not be expected to substantially increase to the point where adverse impacts would occur. However, the extent of the potential impact on nearby recreational areas is indeterminable at this time and would be highly speculative without a thorough understanding of the usage of the Alamo's area and the potential shift of recreational activity. Based on information presented in Appendix F, Wilderness and Wilderness Study Areas, and not including the existing areas proposed for wilderness within the DNWR, there are over 1.4 million acres of land that contain wilderness qualities within and surrounding the NTTR ROI, consisting of both Wilderness Areas and WSAs.

Other foreseeable future actions would be consistent with current activities in the area and would not precipitate changes in land use patterns, ownership, or management practices. Within a 100-mile radius of the NTTR project area, there are numerous opportunities for public recreational use, including county and city parks, private OHV parks, and state and federal lands open to motorized and nonmotorized uses. Therefore, only minor cumulative impacts are expected to land use (i.e., recreational

use) when considered in conjunction with other applicable past, present, and reasonably foreseeable future projects.

Visual Resources

There are several present actions and reasonably foreseeable future projects within the vicinity of the NTTR that would involve the construction of new facilities, adding anthropogenic elements to the landscape and possibly contributing to light pollution. Projects that occur within areas where human-made elements already dominate the landscape, such as the construction and demolition activities that are a part of the F-35 beddown at Nellis AFB, conform to the visual expectations of viewers and to the existing landscape character and, therefore, are of low sensitivity and impact. Other projects, such as the capital improvements at Nellis AFB and Creech AFB, have the potential to have a positive impact on light pollution through the conformance to LEED design specifications on exterior lighting that minimize light trespass and glare. The projects that do not affect the physical environment will not affect visual resources; these projects are limited to the Pahrump Valley Desert Tortoise HCP and the Goldfield Historic District.

Projects such as the mountain bike trails (City of Beatty, Nye County) and OHV trails (Nye County) have the potential to introduce some new elements to the landscape, such as small signage or fencing. However, as long as trails run along existing roads, new ground disturbance could be minimal, and, therefore, there would be little change to the existing visual environment. There are no large-scale construction elements associated with these projects that would introduce sources of light pollution or obtrusive elements to the landscape. Visually, the trails would be consistent with current management plans of the area and viewer expectations.

The projects that could have the greatest cumulative effects are those that create development in areas with few existing human features. Areas of concentrated development, such as the Lincoln County Industrial Park, Amargosa Farm Road Solar Energy Project, and the CSN (Lincoln County), will involve relatively dense construction and development. In contrast, the new elements associated with the Clark, Lincoln, and White Pine Counties Groundwater Development Project or the Lincoln County Land Act Groundwater and Utility Right-of-Way Project would be dispersed throughout the landscape. Where new facilities are more densely concentrated, the viewer would perceive the landscape as more urbanized, whereas dispersed facilities are less visually intrusive but affect a larger area. Both types of projects have the potential to change the regional landscape from one that is relatively untrammelled and remote to an increasingly urbanized and human-dominated area. Due to the additive character of light pollution and its propagation over large distances, the radiance footprints from various developments could accumulate and merge, contributing light pollution and sky glow into a region currently noted for natural dark skies.

The No Action Alternative, Alternative 1, and Alternative 4, would not contribute to cumulative impacts to visual resources due to the limited introduction of new development and light sources, as well as their consistency with current visual resource management objectives. Alternatives 2 and 3 have the potential to incrementally change

the visual characteristics over the largest region when considered with projects identified in Section 4.1.2 and Section 4.1.3, through new development and light sources introduced into previously untrammeled areas. Development on NTTR in any of the alternatives or in projects in the surrounding area may be visible from the remaining publicly accessible proposed wilderness and recreation areas, creating a transboundary issue where the scenic quality of those areas is degraded (Kelson & Lilieholm, 1999).

4.1.4.5 Wilderness and Wilderness Study Areas

Analysis of cumulative effects to wilderness considers the combined potential impacts from the Proposed Action and applicable past, present, and reasonably foreseeable future projects to the four wilderness qualities defined in Section 3.5.1.1 (Description of Resource). The only past, present, and future actions that may impact wilderness include fire management activities associated with the Nellis AFB Wildland Fire Management Plan and aircraft operations associated with the F-35 beddown and the standup and beddown of the TASS at Nellis AFB. All other projects described in Section 4.1.2 and Section 4.1.3 would not occur within Wilderness Areas, areas proposed for wilderness in the South Range, or WSAs associated with the NTTR ROI and, therefore, they are not discussed further in this section.

Implementation of fire management activities from the Nellis AFB Wildland Fire Management Plan would be consistent with ongoing management strategies of the NTTR. These activities would be conducted in concert with other ecological management actions associated with the Nellis AFB INRMP that support natural resource conservation and promote the preservation of the untrammeled and natural qualities of wilderness. Therefore, combining these activities with the Proposed Action would not result in significant cumulative impacts to wilderness qualities within the NTTR ROI.

The F-35 beddown at Nellis AFB increased aircraft operations over Wilderness Areas and WSAs underlying NTTR airspace units. The noise analyses presented in Section 3.2.2.3 for Alternative 2 and Section 3.2.2.4 for Alternative 3 considered the approximate increased aircraft operations planned for the NTTR in future years. Results from these analyses indicated that noise level increases are not expected to be discernible over baseline conditions. In addition, the increased number of annual sorties associated with TASS operations would represent only a negligible increase over baseline conditions. Therefore, incremental impacts from these activities would not be significant. As discussed in Sections 3.5.1.3 (Wilderness and Wilderness Study Areas) and Section 3.5.2.3 (Alternative 2 – Extend Existing Land Withdrawal and Provide Ready Access in the North and South Ranges), baseline aircraft operations generate noise levels that may result in annoyance of potential visitors to Wilderness Areas, areas proposed for wilderness, and WSAs within the NTTR ROI. Therefore, noise levels generated by future F-35 aircraft and TASS operations associated with these beddowns would similarly affect the solitude qualities of wilderness, because signs of human activities within and outside these areas would be detectable on a regular basis. Combining these activities with the Proposed Action may contribute to cumulative impacts to the solitude or primitive and unconfined recreation quality of wilderness, but

not to a significant level. There would be no cumulative or incremental effects from aircraft operations to untrammeled, natural, and undeveloped qualities of wilderness.

Adverse impacts to the undeveloped quality of wilderness within the NTTR land boundary are anticipated under Alternatives 2 and 3, and adverse impacts to the solitude and/or primitive and unconfined recreation quality are expected under Alternatives 1, 2, and 3. However, in the absence of any identified past, present, or foreseeable future action that would have a significant impact on wilderness qualities to Wilderness Areas and WSAs in the region, combining these activities with any of the action alternatives associated with the Proposed Action would not result in an associated cumulative or incremental impacts. Furthermore, none of the projects described in Section 4.1.2 and Section 4.1.3 would result in a change of land management in the region. Therefore, changing the land use management under Alternatives 2 and/or 3 would not result in an associated cumulative or incremental impact.

4.1.4.6 Socioeconomics

Cumulative effects to socioeconomic resources consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects described in Section 4.1.2 and Section 4.1.3. All of these projects would have a cumulative economic impact. Potential cumulative effects would involve an in- or out-migration of people to the area, which would create a cumulative impact on population, housing, economic activity, recreational use, educational facilities and staffing, and public and base services.

Any reduction in PILT payments associated with the Proposed Action would result in decreased funds for fire and police protection and other services that PILT payments support. Decreased funds for fire/police and emergency services, coupled with activities conducted on the NTTR associated with the Proposed Action, could present cumulative impacts to socioeconomic resources from wildfire hazards on and surrounding the NTTR. Past and present activities, such as implementation of measures in the Nellis AFB Wildland Fire Management Plan and the Fire Management for the Cedar Peak Area Environmental Assessment on the NTTR, could minimize cumulative effects to socioeconomic resources from potential wildfire hazards.

Other relevant past and present actions, such as the TASS beddown and the F-35 beddown at Nellis AFB would provide long term economic value to the local area, while operation of the SolarReserve Crescent Dunes Solar Energy Facility and Amargosa Farm Road Solar Energy Project would provide additional beneficial cumulative impacts as well.

Construction activities typically provide a beneficial economic impact on the area but are short term, only lasting for the duration of the project. However, many short-term projects occurring throughout the year provide a cumulative beneficial economic impact over the long term, depending on the scope of the project. Employment opportunities in the region would contribute to positive economic growth in the area.

The combined operations of the F-35 and TASS beddown would increase personnel by 691 and add 53 million in additional earnings (U.S. Air Force, 2011; 2017o). The Crescent Dunes Solar Energy Facility and Amargosa Farm Road Solar Energy Project have a combined operational employment of up to 220 full time employees and an economic impact of more than 22.7 million per year from operations either directly or indirectly (Tonopah Solar Energy, 2010).

Reasonably foreseeable future actions, such as the mountain biking and the OHV trails, would provide beneficial cumulative impacts to socioeconomic resources from tourism and recreational use in the areas adjacent to the NTTR. Any potential restrictions or limitations to recreational areas, such as an OHV race route, or a decrease in the areas available for recreational use would have an adverse cumulative effect on socioeconomic resources. Strategies to minimize adverse cumulative effects to socioeconomic resources could include implementation of comprehensive plans, capital improvement plans, transportation plans, and other plans and coordination efforts that guide future development activities such as the Nellis AFB CIP and the Creech AFB Capital Improvements Program.

Implementation of the Proposed Action would enable the NTTR to continue as an important economic contributor to the region from employment and income associated with training activities. Other reasonably foreseeable future actions that would involve construction and development in the area would have a positive cumulative impact on the area from continued increases in population, housing, and employment and economic activity such as military and general aviation, energy industries, and agriculture in the area. Additional military training in the area would contribute to the local economy through continued employment and earnings. However, additional and continuing military operations could create further conflicts between military users and the general public and land use compatibility. Coordination between the military and local and regional planning departments would minimize potential conflicts. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts within the ROI.

4.1.4.7 Environmental Justice

Cumulative effects to environmental justice populations consist of the combined potential effects resulting from the Proposed Action and applicable past, present, and reasonably foreseeable future projects. Past and present actions that analyzed potential environmental justice impacts include the F-35 beddown EIS (2011) and the Tonopah Solar Energy, LLC Crescent Dunes Solar Energy Project EIS (Tonopah Solar Energy, 2010) (the "Crescent Dunes EIS"). The F-35 beddown EIS determined that there would be an increase in the number of people in the vicinity of Nellis AFB that would be affected by noise levels within 65 dB DNL or greater. The number of minority would increase from 30,257 to 42,272 and the number of those residents identified as low-income would increase from 5,406 to 6,673. However, both the F35 beddown EIS and the Solar Reserve EIS determined that there were no disproportionate impacts as a result of the proposed actions with implementation of such mitigations as noise attenuation features, which are required for all new residential construction in areas

1 affected by noise levels of 65 dB DNL or greater, noise abatement procedures, and
2 consultation between government agencies and Nevada SHPO. Under the Proposed
3 Action, subsonic and supersonic aircraft noise, munition noise, and ground disturbance
4 noise would not add measurably to the overall noise environment and would not only
5 impact a particular segment of the population and, therefore, no disproportionately high
6 and adverse cumulative impacts to environmental justice communities would be
7 anticipated from the proposed action combined with past and present projects.

8 Reasonably foreseeable actions such as those described in the Nellis CIP EA and the
9 Creech CIP EA would not impact environmental justice communities since the proposed
10 actions would occur in restricted access areas within the boundary of the associated
11 base. Any reasonable foreseeable action that would generate a range of economic and
12 fiscal benefits such as an increase in economic activity, jobs, income, and public
13 services would benefit all members and residents of the community. These benefits
14 also favorably affect minority and low-income populations. Beneficial economic
15 changes can also be coupled with adverse impacts particularly to areas with a growing
16 population, lack of housing, and underfunded public resources, such as the case with
17 the unincorporated town of Alamo in Lincoln County.

18 Potential community improvements such as those identified in the Lincoln County
19 Master Plan (Lincoln County, 2015), which would result in an increase in affordable
20 housing and an increase in funding for recreational parks, trails, and tourism provide
21 benefits throughout the community for all residents, including environmental justice
22 communities. A greater number of facilities and improved facilities at key recreational
23 areas at such areas as those identified in Section 2.3.3.4 could benefit everyone
24 residing in the region, including environmental justice communities. Improved
25 recreational experiences and opportunities associated with new mountain biking trails
26 and OHV trails described in Section 4.1.3 also off-set any adverse impacts from
27 implementation of Alternative 3 in which public access would be restricted. Closures of
28 recreational areas could result in overcrowding in other key recreational areas or a loss
29 of income associated with any reduction in the number of recreational users from
30 restricted access. Data on the extent of any loss of income associated with recreational
31 closures is not available at this time but may affect residents in the region, including
32 environmental justice communities.

33 No significant impacts to noise, safety, land use, cultural, air quality, airspace, and water
34 resources would be anticipated as a result of the Proposed Action. Furthermore, any
35 potential impacts from the Proposed Action associated with these and other resource
36 areas considered would equally affect everyone residing in the region and would not be
37 anticipated to disproportionately affect any one group or locality. Since no
38 disproportionately high and adverse impacts to environmental justice communities or
39 disproportionately high and adverse environmental health and safety impacts to children
40 would be anticipated under the Proposed Action, there would be no cumulative impacts
41 to environmental justice anticipated.

4.1.4.8 Biological Resources

Cumulative impacts consider the effects of past, present, and future actions, described in Section 4.1.2 and Section 4.1.3, on biological resources on a regional level, specifically those resources that may be considered rare or limited. In addition to projects associated with continued use the NTTR, potential current and future projects in the region include construction of Air Force facilities (including projects on Nellis AFB and Creech AFB), residential development, industrial facilities, installation of a solar energy project, placement of pipeline and other infrastructure related to groundwater and utility projects, and development of recreational areas. In addition, ground disturbance would occur during fire management activities. The total area of ground disturbance associated with projects described in Section 4.1.2 and Section 4.1.3 and for which such information is available is nearly 26,000 acres (most of which is attributed to the planned Coyote Springs LLC development), although quantitative data are not available for some of the projects.

Potential cumulative effects to biological resources would be associated with ground disturbance and long-term loss of desert scrub and other unique desert vegetation in Nevada, as well as long-term loss of individuals and habitat of federally or state-listed endangered, threatened, rare, and otherwise sensitive plant and wildlife species, including the federally listed desert tortoise. Habitat fragmentation or possible effects on regional wildlife movements (wildlife corridors), and loss or degradation of habitat caused by erosion, sedimentation, turbidity, dust, fuel spills or introduction of other pollutants, can also result in direct or indirect loss of vegetation and wildlife habitat, including individuals or habitat for sensitive species. Water development projects have the potential to alter surface or groundwater, which can adversely affect aquatic and wetland habitats or limit water availability for wildlife.

Indirect cumulative impacts can occur from the increased potential for invasive species (including landscape plants and domestic pets) and wildland fires associated with commercial, residential, and recreational development, as well as military activities. Wildland fires that could be ignited by military activities pose a significant threat to native vegetation, wildlife, aquatic and wetland habitats, and special status plant species and their habitats both in and outside the existing or proposed NTTR boundary. A Wildland Fire Management Plan provides a framework for fire management, wildland fire suppression, burned area emergency rehabilitation, emergency stabilization, and fuel treatment activities to support the military mission including resource protection and ecosystem management objectives.

Increased recreational development can also impact biological resources, although to a lesser extent. The potential loss of recreational areas associated with the Alternative 3C expansion area could result in a shift of recreational activities to other locations in the region, and potential direct and indirect impacts to biological resources resulting from recreational activities could occur; however, the extent or scope of potential impacts is indeterminable and would be highly speculative without a thorough understanding of the usage of the Alamo areas (which is unknown at this time) and the potential shift of recreation activity. Any potential impacts that could occur would not be expected to

1 increase to a magnitude or for a duration of time that would cause the loss or
2 degradation of biological resources, and there would be no overall significant effects to
3 biological resources.

4 Military actions or projects would follow the regulatory requirements (e.g., NEPA, CWA,
5 ESA) and natural resources management requirements, guidelines, and biological
6 constraints currently being implemented on the NTTR. Implementation of the same
7 planning prior to mission and project activities are required to avoid and minimize
8 impacts to biological resources, including an assessment of cumulative impacts (U.S.
9 Air Force, 2010). Potential cumulative effects of federal actions on federally listed
10 endangered species are addressed project by project through the ESA Section 7
11 consultation process with the USFWS. Through this process, federal agencies and the
12 USFWS jointly assess project-specific effects and develop and implement appropriate
13 measures that reflect current conditions and status of the species. Improvement
14 projects on military lands outside the NTTR, including the F-35 beddown and TASS
15 beddown projects at Nellis AFB and CIPs on Nellis AFB and Creech AFB, may also
16 contribute to the loss or degradation of biological resources, although those effects are
17 likely to be small and localized compared with other past, present, and proposed future
18 actions in the region.

19 For any of the action alternatives, direct impacts to biological resources are likely to
20 occur as a result of continued military use of the NTTR, including loss of native desert
21 scrub vegetation, wildlife and habitat, aquatic and wetland habitats, and special status
22 species and their habitats. There is also the potential for loss associated with wildfires
23 and spread of invasive species, which is difficult to measure. The length of the
24 withdrawal period is relevant. The longer the withdrawal period (e.g., for Alternative 2
25 and 3), the more impacts there will be on the land and biological resources). However,
26 based on the size of the NTTR and the surrounding area compared with the amount of
27 acreage that would be used for military training, direct impacts to biological resources
28 would be minimal. Sensitive habitat areas, including aquatic and wetland habitats,
29 would be avoided to the extent practicable, and impacts on special status plant and
30 wildlife species would be minimized and mitigated if required. Indirect impacts
31 associated with invasive species are minimized by using BMPs to prevent their
32 establishment, monitor for new establishment, and manage existing populations. The
33 level of the cumulative impacts to biological resources depends on whether the effects
34 of disturbance are significant on a regional level and the sensitivity of the resource.
35 However, for any of the action alternatives, military activities would contribute little to
36 regional cumulative adverse direct or indirect impacts on biological resources on a
37 regional level.

38 Extension of the existing NTTR withdrawal, as well as the addition of any of the
39 proposed expansion areas, may have beneficial cumulative impacts insofar as it would
40 maintain or increase protection of regional vegetation, wildlife, aquatic habitats and
41 wetlands, and special status species and their habitats from the impacts associated with
42 urbanization and nonmilitary land uses, such as development, recreation, grazing, and
43 mining. The proposed withdrawal effort would also serve to continue, and under

expansion increase, natural resource management on Air Force lands, which also results in increased opportunities for resource protection.

Under the No Action Alternative, all or a percentage of the lands currently restricted may be open to a variety of public and private uses, such as commercial or residential development, recreation, grazing, and mineral extraction. These uses could result in greater loss or disturbance to biological resources than occurs under current Air Force use.

4.1.4.9 Cultural Resources

Damage to the nature, integrity, and spatial context of cultural resources can have a cumulative impact if the initial act is compounded by other similar losses or impacts. The alteration or demolition of historic structures or the disturbance or removal of cultural artifacts may incrementally and cumulatively impact the cultural and historic setting of an area or region.

For the Native American perspective on information in this section, please see Appendix K, paragraph 4.1.4.9.1.

In general, recreational activities have historically occurred within proposed expansion areas, and military activities have occurred in the existing withdrawal areas under consideration. Activities on the NTTR that involve potentially ground-disturbing activities are guided by the Nellis AFB ICRMP and existing Air Force instructions. Given the required coordination with the Nellis AFB Cultural Resources Office, as well as any measures recommended by the SHPO as part of future Section 106 actions, future mission activities are not expected to cumulatively impact cultural resources. None of the alternatives would involve specifically located construction, demolition, or training activities. Any proposed activities or projects involving ground disturbance could be subject to further consideration under the NHPA as well as NEPA prior to implementation. Ordnance delivery and other operational activities would occur on existing ranges and target impact areas approved for such activities on the NTTR. As described in this LEIS, flight operations, construction, and munitions use, as well as other activities discussed, are unlikely to result in adverse effects to NRHP-eligible cultural resources.

An increase in overflights or sonic boom frequency could potentially adversely affect traditional use locations or sacred sites by creating sonic disturbance to the setting. However, consultation with Native American groups would continue through the Native American Program to identify areas of concern and determine the extent of effects to these resources. No adverse impacts to cultural or traditional resources associated with NTTR operations are anticipated when considered cumulatively with other actions in the same area.

There are 2,889 cultural resource locations (prehistoric, historic and ethnographic) currently identified within the boundaries of the NTTR. There are an additional 2,111 resources located within the NTTR airspace. The total number of resources identified by other past, present and future projects described below is 159. Current

1 cultural resource sites on the NTTR represents the majority of cultural resource sites
2 identified in the region.

3 All of the projects described in the past, present and future projects within the region
4 either had no historic properties present within the APE, or resulted in no adverse
5 effects to cultural resources or resulted in a resolution of adverse effects thereby
6 completing the Section 106 process. In the projects where historic properties were to
7 be impacted (e.g., Amargosa Farm Road Solar Energy Project, Crescent Dunes Solar
8 Energy Project, Coyote Springs Investment Planned Development Project, and the Fire
9 Management for Cedar Peak on NTTR), then data recovery was required, treatment
10 plans were created, or existing agreements led to a resolution of adverse effects.

11 There are 142 archaeological sites that were identified in the APE of the Crescent
12 Dunes Solar Energy Project (Tonopah Solar Energy, 2010). Of these 13 were identified
13 as historic properties. The Proposed Action impacted four of these properties and
14 required a BLM Historic Property Treatment Plan for each to resolve adverse effects.
15 The Coyote Springs Investment Planned Development Project EIS (Entrix, 2008) (the
16 “Coyote Springs Development EIS”) identified four historic roads and 27 prehistoric
17 sites. These sites were recommended for additional Section 106 consultations in
18 cooperation with the BLM and SHPO through an existing MOU. The Amargosa Farm
19 Road Solar Energy Project (EPG, 2010) identified 13 archaeological sites, of which
20 1 was considered eligible for listing on the NRHP and required mitigation in the form of
21 data recovery. The Fire Management for Cedar Peak on NTTR EA (U.S. Air Force,
22 2015b) identified two archaeological sites and three isolates. One of the sites is
23 considered eligible for the NRHP and requires a protective buffer as mitigation against
24 forest management activities. The Nellis AFB Capital Improvements Program EA (U.S.
25 Air Force, 2013a) identified one archaeological site considered ineligible to the NRHP
26 and determined that no cultural resources would be impacted by this action. The “Tough
27 Mudder”, L.L.C., EA (BLM, 2012d) identified one archaeological site and subsequently
28 modified the APE to avoid this resource. The “Vegas to Reno” Race Event EA 2009
29 (BLM, 2016j) is utilizing previously identified routes and does not affect any cultural
30 resources.

31 The F-35 beddown EIS reviewed sites located under the NTTR airspace and
32 determined potential impacts that may be caused by the beddown. In total,
33 5,000 cultural resources and 50 traditional use properties were identified under the
34 airspace. It was determined that the cultural sites and traditional cultural properties
35 would be unaffected by the proposed action (U.S. Air Force, 2011).

36 The Desert Tortoise HCP (Nye County Planning Department, 2009), the Oasis Valley
37 Recreation Trails Master Plan (GRO Trails and Race Consulting, 2016), the Lincoln
38 County Master Plan (Lincoln County, 2015), the Creech AFB Capital Improvements
39 Program EA (U.S. Air Force, 2013b) and the TASS EIS (U.S. Air Force, 2017o) did not
40 identify any cultural features or sites considered eligible to the NRHP.

41 None of the regional development projects discussed have been identified as
42 significantly contributing to cumulative impacts to cultural resources. Most of these
43 projects are subject to Section 106 of the NHPA. If impacts to these resources are

anticipated due to proposed activities, plans for the protection or mitigation of these resources must be developed by the proponent in consultation with the SHPO and other consulting parties as appropriate. Future federally funded or permitted undertakings would be required to follow the NHPA Section 106 process, and as a result, any potential adverse effects to cultural resources would be resolved through completion of that process. If proper mitigation or protective measures are undertaken in consultation with the SHPO and other consulting parties for structures, resources, or sites, no significant cumulative impacts to cultural resources are expected when considered in conjunction with other actions.

4.1.4.10 Earth Resources

Analysis of cumulative impacts to earth resources focused on activities with a discernible potential for the withdrawal or expansions to affect the nature of earth resources at the regional scale. Changes to soils associated with the withdrawal would not substantially alter earth resources in the area. Conceptually, the proposed actions would occur over time and are generally consistent with existing uses of the NTTR and would not be expected to substantially affect earth resources in the NTTR region.

Potential construction-related soil disturbances at multiple adjacent locations can have cumulative impacts. If the actions are concurrent, windborne eroded soil and transport of eroded soil through stormwater runoff can have cumulative impacts on air and water quality. Cumulative impacts from erosion would be negligible on the NTTR and in the general study area due to several factors. In general, these activities would be spread over a large geographic area and would occur over a long period of time, dissipating the overall impacts. Also, although erosion does commonly result from storm events, precipitation in the region is relatively low, reducing risks for water-caused erosion. In addition, the Air Force and state regulations require BMPs to minimize erosion and stormwater runoff.

An extension of the current NTTR would continue to impact earth resources as described under the baseline condition. Expansion under Alternative 3 would involve ground-disturbing activities, but details regarding those activities are only known in a conceptual framework and amount to less than 100 acres of disturbance. When this number is compared to other past, present, and future projects described below, it represents orders of magnitude less than other regional ground-disturbing activity. Any subsequent development or use would require additional consideration under NEPA and in conjunction with the NDEP.

Proposed future dismounted troop movements could potentially damage earth resources, but that is unlikely given the size and scope of such activities. The continued restriction of access to the NTTR and USFWS-managed DNWR areas in the Alternative 3C proposed withdrawal area, which are currently not open to mining activities, could delay extraction of potentially recoverable resources if safety conditions and economic factors were to make such recovery feasible. A total of 21,060.6 acres of ground disturbance was identified in past, present, and future regional projects. This number is far lower than the probable total disturbance occurring in the area but shows

1 a good overview of effects to earth resources in the area from a variety of projects. The
2 following projects involved some degree of soil disturbance; the Coyote Springs
3 Development EIS, the F-35 beddown EIS, the Oasis Valley Recreation Trails Master
4 Plan, the TASS beddown at Nellis AFB, the Fire Management Plan for Cedar Peak on
5 NTTR EA (U.S. Air Force, 2015b), the “Tough Mudder” L.L.C., EA (BLM, 2012d). The
6 remaining projects in this section either did not contain adequate information to provide
7 an analysis or did not impact earth resources.

8 The Coyote Springs Development EIS identified 20,960 acres of disturbance from
9 planned development and a utility corridor (Entrix, 2008). The F-35 beddown EIS would
10 involve 36 acres of ground disturbance that would occur primarily in previously
11 developed areas. The Oasis Valley Recreation Trails Master Plan proposes
12 32.19 miles of new trails with a rough average width of 9 feet per trail given trail and
13 right-of-way measurements (GRO Trails and Race Consulting, 2016). This is
14 approximately 35 acres of disturbance to previously undeveloped property. The TASS
15 EIS identified 18.5 acres of disturbance owing to construction within previously
16 developed areas (U.S. Air Force, 2017o). The Fire Management Plan for Cedar Peak
17 on NTTR EA (U.S. Air Force, 2015b) identified 6 acres of disturbance within a high
18 slope, high erosion risk area. The BLM estimates that 2.3 acres of the “Tough Mudder”
19 L.L.C., EA (BLM, 2012d) course could potentially be impacted by erosion due to heavy
20 rainfall events, while 2.8 acres of the course are of the proper soil type and slope to
21 resist erosion risk.

22 The “Vegas to Reno” Race Event EA (BLM, 2016j), the Crescent Dunes Solar Energy
23 Project (Tonopah Solar Energy, 2010) environmental analysis, the Lincoln County
24 Industrial Park study, the Creech AFB Capital Improvement Plan EA, the Nellis AFB
25 Capital Improvement Plan (U.S. Air Force, 2013a) and the Amargosa Farm Road Solar
26 Energy Project (EPG, 2010) did not provide specific details for determining acreage of
27 total disturbance allowing for an adequate analysis of impacts to soils. Lincoln County
28 Industrial Park Master Plan (Lincoln County, 2015) potentially represents thousands of
29 acres of new development but no specific numbers are available at this point given the
30 high order view that the Master Plan provides.

31 No earth resources would be impacted by the Desert Tortoise HCP (Nye County
32 Planning Department, 2009).

33 Any potential cumulative impacts to earth resources would be reduced through
34 adequate project planning, fulfillment of NPDES requirements, and implementation of
35 other site-specific BMPs in relation to other past, present, and future actions.

36 **4.1.4.11 Water Resources**

37 Cumulative effects to water resources consist of the combined potential effects resulting
38 from the Proposed Action and applicable past, present, and reasonably foreseeable
39 future projects described in Section 4.1.2 and Section 4.1.3. These projects would be
40 unlikely to result in direct impacts to surface waters. Potential cumulative effects to
41 water resources would be associated with construction and other ground-disturbing
42 activities, operation of new facilities, and increased groundwater use.

1 With the exception of the Goldfield Historic District project and fire management
2 activities, all other projects would involve some level of ground disturbance, including
3 construction of Air Force facilities, housing, industrial facilities, and recreational areas;
4 installation of a solar energy project; and placement of pipeline and other infrastructure
5 related to groundwater and utility projects (including Utility Corridor 18-224). Ground
6 disturbance could also potentially occur during fire management activities on the NTTR.
7 Ground disturbance can result in erosion of soil and any associated contaminants due
8 to rainfall runoff and, to a lesser extent, wind. Erosion can lead to sedimentation or
9 introduction of contaminants into surface waters. In sufficient quantity, sediments and
10 contaminants can negatively affect water quality. The total area of ground disturbance
11 associated with projects for which such information is available is nearly 26,000 acres
12 (F-35 beddown at Nellis AFB, TASS beddown at Nellis AFB, off-highway trails and other
13 recreational projects, CSN, Lincoln County Industrial Park, and the Amargosa Farm
14 Road Solar Energy Project). Of these projects, most of the ground disturbance is
15 attributed to the planned Coyote Springs LLC development (about 21,000 acres).
16 Quantitative data is not available for the remaining projects. It is anticipated that the
17 majority of ground-disturbing activities described in Section 4.1.2 and Section 4.1.3
18 would be subject to NPDES permitting requirements and conducted in accordance with
19 management practices designed to minimize the potential for erosion. A wide range of
20 such practices may be implemented, including, but not limited to silt fencing, sediment
21 traps, and placement of straw bales or sand bags. Trees would be felled by hand during
22 fire management activities at the Cedar Peak area on the NTTR in order to avoid soil
23 impacts. With implementation of permit requirements and appropriate management
24 practices, the cumulative amount of erosion resulting from the Proposed Action and
25 other past, present, and future actions is unlikely to significantly affect surface waters.

26 Some of the projects would result in long-term placement of structures such as houses,
27 industrial facilities, and Air Force facilities (F-35 beddown at Nellis AFB, TASS beddown
28 at Nellis AFB, Nellis and Creech AFB CIPs, CSN, Lincoln County Industrial Park,
29 Amargosa Farm Road Solar Energy Project, and multiple groundwater and utility
30 projects). The structures and related elements such as parking areas, sidewalks, and
31 roads would increase the amount of impervious surface in the ROI, which would
32 increase the amount of stormwater runoff. In addition, increased vehicle use would likely
33 result in additional petroleum products (gasoline, oil, etc.) present on some of the
34 impervious surfaces. Increased runoff could result in erosion, downstream flooding, and
35 conveyance of pollutants into surface waters. Although quantitative data are not
36 available for the area of impervious surface or the types and quantities of pollutants
37 potentially conveyed to surface waters, it is expected that stormwater management
38 features would be part of the permitting process and long-term design for each project.
39 With implementation of stormwater management practices, the cumulative effects of
40 stormwater runoff on surface waters resulting from the Proposed Action and other past,
41 present, and future actions is not expected to be significant.

42 Several of the identified past, present, and reasonably foreseeable future actions would
43 result in increased water use in the ROI. Projects that involve increased population
44 (either military or civilian) would result in additional water demand. New industrial

1 facilities would also require additional water. Although data are not available for all
2 projects, a total of about 22,000 AFY of groundwater withdrawal would occur as a result
3 of implementing projects that have quantitative data available (SolarReserve Crescent
4 Dunes Solar Energy Facility, Coyote Springs LLC development, Amargosa Farm Road
5 Solar Energy Project, and Kane Springs Valley Groundwater Development project). In
6 addition, an increase in water use of about 400,000 gallons per day is estimated for the
7 F-35 weapons school beddown at Nellis AFB. The additional water use is anticipated in
8 association with program activities (e.g., aircraft washing) and an increase in on-base
9 personnel. Three of the projects would involve groundwater extraction and transport. Air
10 Force well water appropriations on the NTTR are underutilized, and therefore, there
11 would likely be no requirement for additional surface or groundwater appropriations
12 associated with Air Force activities. Of the 27 hydrographic basins associated with the
13 NTTR, 10 are currently either fully allocated or overallocated. Although groundwater
14 resources are likely sufficient to support other nonmilitary projects in the area, new
15 groundwater rights and appropriation requests would require review and approval by the
16 Nevada State Engineer's Office. State review would also include evaluation of potential
17 effects to migration of groundwater contaminated by historical nuclear device testing.

18 **4.1.4.12 Hazardous Materials and Solid Wastes**

19 Maintenance operations associated with two reasonably foreseeable future actions
20 identified in Section 4.1.3 (i.e., the TASS beddown and the F-35 beddown) would likely
21 result in an increase in the quantity of hazardous materials used and hazardous wastes
22 generated at Nellis AFB. These materials and wastes would continue to be managed
23 according to established procedures and disposal practices. Additionally, these
24 materials and waste would not adversely impact the existing management system or the
25 regional disposal capacity. Consequently, implementation of the Proposed Action
26 combined with past, present, and reasonably foreseeable future projects would not
27 result in significant cumulative impacts associated with increases in the quantity of
28 hazardous materials used, the quantity of wastes generated, or off-site impacts related
29 to regional disposal capacity.

30 It would also be anticipated that the estimated increase in training from the standup of
31 an F-16 TASS and the F-35 beddown, when combined with Alternatives 1, 2, or 3,
32 would result in an associated, proportional increase in the quantity of chemicals
33 released from munitions training. The Air Force currently complies with TRI reporting
34 requirements and would continue to track ordnance use associated with these future
35 actions. Based on the type of munitions that would likely be used, no new chemical
36 thresholds would be exceeded and no additional reporting would be required.
37 Additionally, the Air Force would continue to implement established range cleanup
38 procedures. Consequently, implementation of the Proposed Action combined with past,
39 present, and reasonably foreseeable future projects would not result in significant
40 cumulative impacts associated with increases in the quantity of hazardous materials
41 released during training.

4.1.4.13 Health and Safety

An increase in flight operations associated with two reasonably foreseeable future actions identified in Section 4.1.3 (i.e., the TASS and the F-35 beddown) would result in an associated increase in the cumulative potential for mishaps or bird strike, especially during periods of migration. Many bird species use mountain ranges as migration corridors and the Sheep Range attracts various bird species because of the elevation, habitat diversity, and presence of water. As with Alternatives 1, 2, and 3, implementation of procedures discussed in Section 3.13.2.2 would ensure that the potential adverse impacts from mishaps and bird strikes would remain low.

The increase in training activities also has the potential to increase munitions-related fires. For Alternative 3C, ground disturbance has the potential to result in an expansion of invasive annual grass that could result in increased wildfire risk. Resulting wildfire smoke can also impact aviation and ground personnel safety, as well as nearby communities and sensitive populations. An increase in flight operations may also require additional airspace de-confliction where a wildfire response would include civilian firefighting aircraft.

Adherence to established safety protocols for any wildland fire management activity would continue, including the use of appropriate personal protective equipment and communications links between all parties. Therefore, implementation of the Proposed Action combined with past, present, and reasonably foreseeable future projects would not result in significant impacts to the safety environment within the ROI.

4.1.4.14 Transportation

Increased growth in the Las Vegas area is expected to continue to have an impact on regional traffic flow. The proposed withdrawal effort would primarily impact only existing roads within the DNWR Alamos area and would not disrupt local traffic flow. Therefore, there is minimal potential for cumulative impacts to local transportation associated with the proposed withdrawal efforts, because the proposed withdrawal extension/expansion would not have an impact on any major public roadways.

One of the alternative routes being considered for the I-11 and Intermountain West Study Corridor would utilize the U.S. Route 95 corridor west of Las Vegas that borders the South and North Ranges of the NTTR. The project is an effort by Arizona, Nevada, and other Intermountain West states and the federal government to develop a transportation corridor between the Rocky Mountains and the Cascade Range/Sierra Nevada Mountains linking Mexico and Canada. One of the potential study area segments is the Northern Nevada Future Connectivity Corridor. U.S. Route 95 also is adjacent to the proposed withdrawal areas for Alternatives 3A and 3B. Withdrawal of either of these areas could potentially limit the possible alignments of the proposed corridor because of the restricted access associated with the withdrawal area. Although this might result in the need for additional planning and design to avoid conflicts, it should not result in significant adverse transportation impacts.

4.2 OTHER ENVIRONMENTAL CONSIDERATIONS

4.2.1 Relationship Between Short-Term Uses and Long-Term Productivity

Military training activities that could include future munitions use or construction of threat emitters or roads would result in a short-term use of resources. Long-term productivity impacts are determined by comparing the project's impacts against long-term regional and local planning objectives. Impacts are associated with land use changes, population increases, and the related traffic and socioeconomic factors. The short- and long-term effects of the Proposed Action and alternatives are summarized below.

4.2.2 Short-Term Uses

All alternatives would have minor short-term effects related to conceptual construction and military activities through the use of construction-related materials, munitions, fuels, etc. The significant economic benefits created during construction and military activities in the form of jobs, and the direct and indirect demand for goods and services, would offset the short-term use of the environment.

4.2.3 Long-Term Productivity

Long-term adverse impacts on productivity as a result of unmitigated short-term impacts and uses would include the following:

- Increased noise levels associated with the additional aircraft operations in the Alamo airspace
- Reduced public access to USFWS lands

Long-term beneficial impacts on productivity would include the following:

- Overall support of the region's continued economic development through:
 - Creation of more jobs locally
 - Increased tax base
 - Increased revenues for local businesses
 - Increased revenues for local utilities
 - Continued military mission

4.2.4 Short-Term Uses Versus Long-Term Productivity

Many of the potential adverse impacts on long-term productivity are the result of short-term factors, which are often mitigated through planning aspects when implementing a proposed action and/or alternatives; public access is one example. The Proposed Action and alternatives analyzed in this document would have immediate short-term impacts on public access with long-term implications.

Public access to a large area of the DNWR would be curtailed. The reduction in public access will result in both short- and long-term impacts for those that would like year-round access to all areas of the DNWR. In addition, the reduced public access will have short-term impacts since the public will not have access for some seasonal activities such as bird watching.

4.2.5 Irreversible and Irretrievable Commitment of Resources

NEPA requires environmental analysis to identify any irreversible and irretrievable commitments of resources involved in the implementation of the Proposed Action or alternatives. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. *Irreversible* effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable timeframe. *Irretrievable* resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

Implementing the Proposed Action through any of the alternatives would require a commitment of natural, physical, human, and fiscal resources. In all of these categories, irreversible and irretrievable commitments of resources would occur. Land required for military operations would be irreversibly committed during the withdrawal period; in some cases, land uses would change. Although it is possible for land to revert to its former state where land withdrawal was not renewed, the likelihood of such an occurrence for the NTTR would be low.

Public access to lands that have biological resources would be irreversibly and irretrievably lost with the proposed project, and some areas of wildlife habitat would be lost as well. This loss could create habitat fragmentation impacts, which would be a concern for certain wildlife such as the bighorn sheep. However, based on the size of the surrounding area compared with the amount of acreage that would be used for military training, the loss would be minimal; sensitive habitat areas would be avoided to the extent practicable and impacts on sensitive species would be mitigated.

The proposed commitment of natural, physical, human, and fiscal resources is based on the requirements mandated by Congress. It is anticipated that businesses, employees, and residents of the local area would benefit from improved economics resulting from implementation of the Proposed Action.

5. REFERENCES

- 105th Congress. (1997). *Public Law 105-57, October 9, 1997: National Wildlife Refuge System Improvement Act of 1997*.
- 99 CES/CEIEA. (2015). *Desert Tortoise Managment Guidelines Final Report*. Nellis Air Force Base Natural Resources Team. Prepared for U.S. Air Force through the U.S. Army Corps of Engineers Contract # 4912BV-12-D-0016.
- Argonne National Laboratory. (2016). *Section 368 Corridor Study*. May.
- Battis, J. C. (1983). *Seismo-Acoustic Effects of Sonic Booms on Archaeological Sites, Valentine Military Operations Area*. Air Force Geophysics Laboratory. October.
- Battis, J. C. (1988). *Effects of Low Flying Aircraft on Archaeological Structures*. Air Force Geophysics Laboratory. September.
- Bay West and SAIC. (2009). *Nevada Test and Training Range (NTTR) Decontamination Estimate, Hazardous and Solid Waste, and Radioactive Materials from Active and Inactive Test and Target Areas*. Prepared by Bay West and Science Applications International Corporation. November.
- BEA. (2015). *CA6N Compensation of Employees by NAICS Industry*. Query for Nevada, Clark County, Lincoln County, and Nye County, Bureau of Economic Analysis. November 19.
- BEA. (2016). *Gross Analysis Regional Product, Wages and Employment CA25N (Total full-time and part-time employment by North American Industry Classification System industry) and CA6N for United States, State of Nevada, Clark, Lincoln, and Nye Counties, 2004, 2009-2014*. U.S. Bureau of Economic Analysis.
- Bechtel SAIC Company. (2007). *Identification of Aircraft Hazards*. Bechtel SAIC Company, LLC, Las Vegas, NV. July.
- Belcher, W. R., & Sweetkind, D. S. (2010). *Death Valley Regional Groundwater Flow System, Nevada and California – Hydrogeologic Framework and Transient Groundwater Flow Model*. U.S. Geological Survey, prepared in cooperation with U.S. Department of Energy, Professional Paper 1711, 398 p.
- Bengston, G. (2005). *Thirsty Canyon, Nevada Test and Training Range and the Shoshones of Oasis Valley*. Prepared for Nellis Air Force Base. September.

- 1 Berris et al. (2003). S. N. Berris, E. J. Crompton, J. D. Joyner, and R. Ryan. *Water*
2 *Resources Data, Nevada, Water Year 2002*.
- 3 Berry, K. (1990). *The status of the desert tortoise (Gopherus agassizii) in California in*
4 *1989*. Draft report to the U.S. Fish and Wildlife Service, Portland, Oregon.
- 5 Blainey, J. B., Webb, R. H., & Magirl, C. S. (2007). *Modeling the Spatial and Temporal*
6 *Variation of Monthly and Seasonal Precipitation on the Nevada Test Site and*
7 *Vicinity, 1960-2006*. U.S. Geological Survey Open-File Report 2007-1269.
- 8 BLM. (1981). *Environmental Impact Analysis Process, Department of the Interior, Final*
9 *Environmental Impact Statement Proposed Land Withdrawal Nellis Air Force*
10 *Bombing Range, Nye, Clark, and Lincoln Counties, Nevada*. Prepared by Bureau
11 of Land Management, Department of the Interior, and the Department of the Air
12 Force. April 20.
- 13 BLM. (1986). *Manual H-8410-1 - Visual Resource Inventory*. U.S. Department of the
14 Interior, Bureau of Land Management, Washington, D.C. 20240.
- 15 BLM. (1989). *Handbook H-1741-1 Fencing*. U.S. Department of the Interior, Bureau of
16 Land Management.
- 17 BLM. (1991). *Nevada BLM Statewide Wilderness Report*. U.S. Department of the
18 Interior, Bureau of Land Management. October.
- 19 BLM. (2003). *Proposed Nevada Test & Training Range Resource Management Plan*
20 *and Final Environmental Impact Statement*. U.S. Department of the Interior,
21 Bureau of Land Management, Las Vegas, Nevada. May.
- 22 BLM. (2004). *Record of Decision for the Approved Nevada Test and Training Range*
23 *Resource Management Plan and Final Environmental Impact Statement*. BLM
24 Las Vegas Field Office.
- 25 BLM. (2011). *Visual Resource Inventory*. U.S. Department of the Interior, Bureau of
26 Land Management, Battle Mountain, Nevada District Office.
- 27 BLM. (2012a). *BLM Manual 6310 - Conducting Wilderness Characteristics Inventory on*
28 *BLM Lands*. U.S. Department of the Interior, Bureau of Land Management.
29 March 15.
- 30 BLM. (2012b). BLM Manual 6340 - Management of BLM Wilderness.
- 31 BLM. (2012c). BLM Manual 6330 - Management of Wilderness Study Areas.

- BLM. (2012d). *Tough Mudder, L.L.C. Special Recreation Permit SRP-NVB0000-12-02, Draft Environmental Assessment*. U.S. Department of the Interior, Bureau of Land Management, Tonopah Field Office. DOI-BLM-NV-B020-2012-0216-EA. September 10.
- BLM. (2014). *Draft Resource Management Plan/Environmental Impact Statement, Las Vegas and Pahrump Field Offices*. U.S. Department of the Interior, Bureau of Land Management, Southern Nevada District Office. BLM/NV/LV/ES/14-04+1793.
- BLM. (2015). *Socioeconomic Impacts in Nevada*. Retrieved December 2016, from U.S. Department of the Interior Bureau of Land Management: <https://www.blm.gov/wo/st/en/info/socioeconomic/states/nevada.html>, November 2, 2015.
- BLM. (2016a). *Wilderness Study Areas*. Retrieved October 17, 2016, from U.S. Department of the Interior, Bureau of Land Management: https://www.blm.gov/nv/st/en/prog/blm_special_areas/wsas0.html, August 10, 2016.
- BLM. (2016b). *The Wall Wilderness Study Area*. Retrieved December 13, 2016, from U.S. Department of the Interior, Bureau of Land Management: https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsas.Par.88682.File.dat/The%20Wall.pdf, August 10, 2016.
- BLM. (2016c). *Palisade Mesa Wilderness Study Area*. Retrieved December 13, 2016, from U.S. Department of the Interior, Bureau of Land Management: https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsas.Par.43286.File.dat/Palisade%20Mesa.pdf, August 10, 2016.
- BLM. (2016d). *Kawich Wilderness Study Area*. Retrieved December 13, 2016, from U.S. Department of the Interior, Bureau of Land Management: https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsas.Par.86659.File.dat/Kawich.pdf, August 10, 2016.
- BLM. (2016e). *South Reveille Wilderness Study Area*. Retrieved December 13, 2016, from U.S. Department of the Interior, Bureau of Land Management: https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsas.Par.61717.File.dat/Reveille.pdf, August 10, 2016.
- BLM. (2016f). *Rawhide Mountain Wilderness Study Area*. Retrieved December 13, 2016, from U.S. Department of the Interior, Bureau of Land Management:

- 1 https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsa
2 [s.Par.2323.File.dat/Rawhide%20Mt.pdf](https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsa), August 10, 2016.
- 3 BLM. (2016g). *Grapevine Mountains Wilderness Study Area*. Retrieved December 13,
4 2016, from U.S. Department of the Interior, Bureau of Land Management:
5 https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsa
6 [s.Par.33816.File.dat/Grapevine%20Mt.pdf](https://www.blm.gov/style/medialib/blm/nv/field_offices/battle_mountain_field/wsa), August 10, 2016.
- 7 BLM. (2016h). *Mount Stirling Wilderness Study Area*. Retrieved December 13, 2016,
8 from U.S. Department of the Interior, Bureau of Land Management:
9 https://www.blm.gov/style/medialib/blm/nv/field_offices/las_vegas_field_office/wil
10 [derness_maps/wsas.Par.48038.File.dat/Mount%20Stirling.pdf](https://www.blm.gov/style/medialib/blm/nv/field_offices/las_vegas_field_office/wil)
- 11 BLM. (2016i). *Resting Springs Wilderness Study Area*. Retrieved January 11, 2016,
12 from U.S. Department of the Interior, Bureau of Land Management:
13 https://www.blm.gov/style/medialib/blm/nv/field_offices/las_vegas_field_office/wil
14 [derness_maps/wsas.Par.37684.File.dat/RestingSprings.pdf](https://www.blm.gov/style/medialib/blm/nv/field_offices/las_vegas_field_office/wil)
- 15 BLM. (2016j). *Environmental Assessment, 2016 Best in the Desert “Vegas to Reno” The*
16 *Long Way Race Event*. U.S. Department of Interior, Bureau of Land
17 Management. DOI-BKLM-NV-B020-2016-0041-EA. July 1.
- 18 Boeing, Bell. (2008). *Hover Outwash Profile Comparison of V-22, CH-46A, CH-53E*.
- 19 Bowles et al. (1999). A. Bowles, S. Eckert, L. Starke, E. Berg, and L. Wolski. *Effects of*
20 *Flight Noise from Jet Aircraft and Sonic Booms on Hearing Behavior*. Hubbs Sea
21 World.
- 22 Bowles, A. (1995). Response of Wildlife to Noise. In R. K. Gutzwiller (Ed.), *Wildlife and*
23 *Recreationists* (pp. 109-155). Covelo, California: Island Press.
- 24 Bureau of Justice Statistics. (2011). *Census of State and Local Law Enforcement*
25 *Agencies, 2008*.
- 26 Carlson et al. (2010). T. Carlson, D. Cole, D. Finnan, K. Hood, and J. Weise. *Ensuring*
27 *Outstanding Opportunities for Quality Wilderness Visitor Experiences: Problems*
28 *and Recommendations*. The Wilderness Advisory Group. May.
- 29 CEQ. (2010). *National Environmental Policy Act Regulations, Top 40 Frequently Asked*
30 *Questions*. Retrieved from Council on Environmental Quality:
31 <http://ceq.hss.doe.gov/nepa/regs/40/1-10.HTM#1>

- 1 CGTO. (1997). *Native American Ethnographic Report*. Nellis Air Force Base and Range
2 Complex, Consolidated Group of Tribes and Organizations (CGTO). October.
- 3 CHABA. (1981). *Assessment of Community Noise Response to High-Energy Impulsive*
4 *Sounds*. National Research Council, National Academy of Sciences,
5 Washington, D.C.: Report of Working Group 84, Committee on Hearing,
6 Bioacoustics and Biometrics, and Biomechanics.
- 7 Chapman, J. B., & Lyles, B. F. (1993). *Groundwater at the Nevada Test Site: Data and*
8 *Preliminary Interpretations*. Publication No. 45100, submitted to U.S. Department
9 of Energy. March.
- 10 Christensen, R. (2016). *2016 Historical aircraft mishap data for Nevada Test and*
11 *Training Range (NTTR)*. Provided by Mr. Roger Christensen, Range
12 Environmental Administrator, NTTR, Nellis Air Force Base, Nevada. October.
- 13 County Health Rankings. (2015). *Query for Clark County, Lincoln County, and Nye*
14 *County*. Retrieved October 12, 2016, from County Health Rankings & Roadmaps:
15 <http://www.countyhealthrankings.org>
- 16 Darst et al. (2013). C. R. Darst, P. J. Murphy, N. W. Strout, S. P. Campbell, K. J. Field,
17 L. Allison, R. C. Averill-Murray. A strategy for prioritizing threats and recovery
18 actions for at-risk species. *Environmental Management*. 51(3), 786–800.
- 19 Dawson, C. (2004). Monitoring outstanding opportunities for solitude. *International*
20 *Journal of Wilderness*, 10(3). December.
- 21 Dawson, C., & Hendee, J. (2009). *Wilderness Management: Stewardship and*
22 *Protection of Resources and Values* (4th ed.). Golden, Colorado: Fulcrum
23 Publishing.
- 24 DeMeo et al. (2008). G. A. DeMeo, J. L. Smith, N. A. Damar, J. Darnell. *Quantifying*
25 *Ground-water and Surface-water Discharge from Evapotranspiration Processes*
26 *in 12 Hydrographic Areas of the Colorado Regional Ground-Water Flow System,*
27 *Nevada, Utah, and Arizona*. U.S. Geological Survey Scientific Investigations
28 Report 2008-5116, 22 p.
- 29 Dickerson, R. (2013). *Paleontology and Fossils on the Nellis Air Force Base Military*
30 *Training Lands*. Prepared for Nellis Air Force Base. January.
- 31 DoD. (2005). *DoD Instruction 3200.16, Operational Range Clearance*. Department of
32 Defense, Washington D.C. June.

- 1 DoD. (undated). *DoD Flight Information Publication, Area Planning (AP/1B), Military*
2 *Training Routes, North and South America*. Department of Defense.
- 3 DOE. (2011). *Federal Facility Agreement and Consent Order*. U.S. Department of
4 Energy. May.
- 5 DOE. (2013). *Final Site-Wide Environmental Impact Statement for the Continued*
6 *Operation of the Department of Energy/National Nuclear Security Administration,*
7 *Nevada National Security Site and Off-site Locations in the State of Nevada*.
8 Department of Energy DOE/EIS-0426, pp S3-S4. February.
- 9 DOE. (2015). *DOE Defense Nuclear Facilities, Nevada National Security Site*. Retrieved
10 October 3, 2015, from U.S. Department of Energy, Defense Nuclear Facilities
11 Safety Board: [http://www.dnfsb.gov/about/where-we-work/doe-defense-nuclear-](http://www.dnfsb.gov/about/where-we-work/doe-defense-nuclear-facilities?page=9)
12 [facilities?page=9](http://www.dnfsb.gov/about/where-we-work/doe-defense-nuclear-facilities?page=9)
- 13 DOE. (2016a). *Section 368 Energy Corridor Regional Reviews - Region 1*. Retrieved
14 January 2017, from U.S. Department of Energy (DOE):
15 <http://bogi.evs.anl.gov/section368/abstracts/corridor-18-224.pdf>
- 16 DOE. (2016b). *Groundwater Characterization, Nevada National Security Site*. Retrieved
17 from U.S. Department of Energy:
18 <https://www.nnss.gov/pages/programs/em/GroundwaterCharacterization.html>
- 19 DOI. (2016). *Payment in Lieu of Taxes*. Retrieved January 17, 2017, from U.S.
20 Department of Interior: Frequently Asked Questions:
21 <https://www.doi.gov/pilt/resources/faqs>
- 22 Dooling, R. J., & Popper, A. N. (2007). *The Effects of Highway Noise on Birds*. Prepared
23 by Environmental BioAcoustics LLC for the California Department of
24 Transportation Division of Environmental Analysis.
- 25 Duke, D. (2014). *Nevada Test and Training Range Prehistoric and Ethnographic*
26 *Synthesis: Technical Data Summary*. Far Western Anthropological Research
27 Group, Inc., Henderson, Nevada, submitted to U.S. Army Corps of Engineers,
28 Los Angeles District, Los Angeles, California, and Nellis Air Force Base, Nevada.
- 29 Duke, D. (2016a). *Cultural and Paleontological Resources Survey Plan NTTR Land*
30 *Withdrawal Expansion Areas*. Submitted to Leidos. 13 September.
- 31 Duke, D. (2016b). *Historic Properties Identification Plan*. Letter from Daron Duke (Far
32 Western) to Kevin Akstulewicz (Leidos). November 11.

- 1 ECONorthwest. (2016). *Quiet Recreation on BLM-Managed Lands: Economic*
2 *Contribution 2014*. Prepared for The Pew Charitable Trusts. March.
- 3 Ellis, D., Ellis, C., & Mindell, D. (1991). Raptor Responses to Low-level Jet Aircraft and
4 Sonic Booms. *Environmental Pollution*, 74, 53-83.
- 5 Entrix. (2008). *Coyote Springs Investment Planned Development Project Final*
6 *Environmental Impact Statement, Volume 1*. Prepared for U.S. Fish and Wildlife
7 Service and Cooperating Agencies U.S. Army Corps of Engineers and Bureau of
8 Land Management, by ENTRIX, Inc., Huffman-Broadway Group, and Resource
9 Concepts, Inc. Project # 3132201. July.
- 10 EPA. (1974). *Information on Level of Environmental Noise Requisite to Protect the*
11 *Public Health and Welfare with an Adequate Margin of Safety*. U.S.
12 Environmental Protection Agency Report 550/9-474-004.
- 13 EPA. (2016a). *Nevada Nonattainment/Maintenance Status for Each County by Year for*
14 *All Criteria Pollutants*. Retrieved October 15, 2016, from U.S. Environmental
15 Protection Agency: https://www3.epa.gov/airquality/greenbook/anayo_nv.html
- 16 EPA. (2016b). *Air Emissions Inventories: National Emissions Inventory (NEI)*. Retrieved
17 October 9, 2016, from [https://www.epa.gov/air-emissions-inventories/national-](https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei)
18 [emissions-inventory-nei](https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei)
- 19 EPA. (2016c). *2014 National Emissions Inventory (NEI) Data*. Retrieved October 26,
20 2016, from U.S. Environmental Protection Agency: [https://www.epa.gov/air-](https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data)
21 [emissions-inventories/2014-national-emissions-inventory-nei-data](https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data)
- 22 EPA. (2016d). *Emergency Planning and Community Right-to-Know Act (EPCRA) Toxic*
23 *Release Inventory (TRI) release data for NTTR and Tonopah Test Range*.
24 Retrieved from U.S. Environmental Protection Agency:
25 <https://www.epa.gov/triexplorer>
- 26 EPG. (2010). *Amargosa Farm Road Solar Energy Project Final Environmental Impact*
27 *Statement (Appendix A, Proposed Avoidance, Minimization, and Mitigation*
28 *Measures)*. October.
- 29 FAA. (2014). *FAA Handbook 7400.2, Procedures for Handling Airspace Matters*.
30 Federal Aviation Administration.
- 31 FAA. (2016). *FAA Order 7400.8Y, Special Use Airspace*. Federal Aviation
32 Administration. February 5.

- 1 FAA. (n.d.). *FAA Handbook 7610.4, Special Military Operations*. Federal Aviation
2 Administration.
- 3 Falchi et al. (2016). F. Falchi, P. Cinzano, D. Duriscoe, C. C. M. Kyba, C. D. Elvidge, K.
4 Baugh, B. A. Portnov, N. A. Rybnikova, R. Furgoni. The new world atlas of
5 artificial night sky brightness. *Science Advances* (2)6, e1600377. June 10.
- 6 FICON. (1992). *Federal Agency Review of Selected Airport Noise Analysis Issues*.
7 Federal Interagency Committee on Noise.
- 8 Fire Department.net. (2016). *Query for Pahrnagat Valley Volunteer, Panaca Volunteer,*
9 *Amargosa Fire Department, Nye County Fire Department, Crystal Fire*
10 *Department, Gabbs Fire Department, Manhattan Fire Department, and Tonopah*
11 *Fire Department*. Retrieved October 11, 2016, from Fire Department.net:
12 <http://www.firedepartment.net>
- 13 GRO Trails and Race Consulting. (2016). *Oasis Valley Recreation Trails Master Plan*.
14 Produced in cooperation with the Bureau of Land Management Tonopah Field
15 Office through the partnership with Trails-OV set forth in the Memorandum of
16 Understanding BLM_NV_MOU_NV0600-2015-015 (signed on July 29, 2015).
17 July 27, 2016.
- 18 Grubb, R. M., & King, T. G. (1991). Assessing Human Disturbance of Breeding Bald
19 Eagles with Classification Tree Models. *Journal of Wildlife Management*, 55(3),
20 500–511.
- 21 Hall et al. (1997). L. S. Hall, P. R. Krausman, and M. L. Morrison. The habitat concept
22 and a plea for standard terminology. *Wildlife Society Bulletin*. 173–182.
- 23 Heilweil, V. M., & Brooks, L. E. (2011). *Conceptual Model of the Great Basin Carbonate*
24 *and Alluvial Aquifer System*. U.S. Geological Survey Scientific Investigations
25 Report 2010-5193, 191 p, V. M. Heilweil and L. E. Brooks, eds.
- 26 Hendee, J. C., & Dawson, C. P. (2001). Stewardship to Address the Threats to
27 Wilderness Resources and Values. *International Journal of Wilderness*, 7(3), 4–
28 9.
- 29 Henen, B. T. (1998). Effects of Climatic Variation on Field Metabolism and Water
30 Relations of Desert Tortoises. *Oecologia*, 117, 365–373.

- 1 Houghton, J. G., Sakamoto, C. M., & Gifford, R. O. (1975). *Nevada's Weather and*
2 *Climate*. Special Publication 2. Nevada Bureau of Mines and Geology, Mackay
3 School of Mines.
- 4 Jones, R. G. (2004). Does-response relationships of harlequin duck behavior to noise
5 from low-level military jet over-flights in central Labrador. *Environmental*
6 *Conservation*, 289-298.
- 7 Kelson, A. R., & Lilieholm, R. J. (1999). Transboundary issues in wilderness
8 management. *Environmental Management*, 23(3), 297–305.
- 9 Kelson, R., & Lilieholm, R. J. (1997). The influence of adjacent land activities on
10 wilderness resources. *The International Journal of Wilderness*, 3(1), 25–28.
- 11 Krausman, P. M. (1998). Effects of jet aircraft on Mountain Sheep. *Journal of Wildlife*
12 *Management*, 1246–1253.
- 13 Lachman et al. (2016). B. E. Lachman, J. A. Ausink, W. A. Williams, K. Pfrommer, and
14 M. J. Carrillo. *The Nevada Test and Training Range (NTTR) and Proposed*
15 *Wilderness Areas: Issues Affecting the NTTR's Land Withdrawal Renewal*. Santa
16 Monica, CA: Rand Corporation.
- 17 Landres et al. (2005). P. Landres, S. Boutcher, L. Merigliano, C. Barns, D. Davis, T.
18 Hall, H. Henry, B. Hunter, P. Janiga, M. Laker, A. McPherson, D. Powell, M.
19 Rowan, S. Sater. *Monitoring Selected Conditions Related Wilderness Character:*
20 *A National Framework*. Fort Collins, CO: Rocky Mountain Research Station. 38
21 p. April.
- 22 Landres et al. (2008). P. Landres, C. Barns, J. G. Dennis, T. Devine, P. Geissler, C. S.
23 McCasland, L. Merigliano, J. Seastrand, R. Swain. *Keeping It Wild: An*
24 *Interagency Strategy to Monitor Trends in Wilderness Character Across the*
25 *National Wilderness Preservation System*. Fort Collins, CO: Rocky Mountain
26 Research Station. 77 p.
- 27 Landres et al. (2015). P. Landres, C. Barns, S. Boutcher, T. Devine, P. Dratch, A.
28 Lindholm, L. Merigliano, N. Roeper, E. Simpson. *Keeping it Wild 2: An Updated*
29 *Interagency Strategy to Monitor Trends in Wilderness Character Across the*
30 *National Wilderness Preservation System*. Fort Collins, CO: Rock Mountain
31 Research Station. 114 p.

- Lincoln County. (2015). *Master Plan for Lincoln County, Nevada*. Lincoln County Board of County Commissioners and the Lincoln County Planning Commission. Adopted on September 4, 2007, Amended on April 20, 2015.
- Lopes, T. J. (2006). *Quality of Nevada's Aquifers and Their Susceptibility to Contamination, 1990–2004*. U.S. Geological Survey Scientific Investigations Report 2006-5127.
- Low, L. B. (2016). Personal communication via e-mail from Lt. Col Brian Low (NTTR XP [Range Planning]) to Henry McLaurine (Leidos). February 26.
- Manci et al. (1988). K. M. Manci, D. N. Gladwin, R. Vilella, M. Cavendish. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: a Literature Synthesis*. Ft. Collins, CO: U.S. Fish and Wildlife Service National Ecology Research Center, NERC-88/2.
- McEldery. (2016). *NTTR LEIS Wildland Fire Management Summary*. U.S. Department of the Interior, Bureau of Land Management. Provided by Sean McEldery, Fuels Program Manager, BLM Southern Nevada District, October 27.
- McEldery, S. (2016). *Wildland Fire Management Summary for the Nevada Test and Training Range Legislative Environmental Impact Statement*. MS Word file provided by Mr. Sean McEldery, Fuels Program Manager/Fire Planner, Bureau of Land Management (BLM) Southern Nevada District. 27 November.
- Moreo et al. (2014). M. T. Moreo, G. B. Senay, A. L. Flint, N. A. Damar, R. J. Laczniak, J. Hurja. *Hydroclimate of the Spring Mountains and Sheep Range, Clark County, Nevada*. <http://dx.doi.org/10.3133/sir20145142>.
- NASA. (1976). *Concorde Noise-Induced Building Vibrations for Sully Plantation Chantilly, Virginia*. National Aeronautics and Space Administration, Langley Research Center, Hampton, Virginia. Technical Memorandum 76-919.
- NASA. (1978). *Concorde Noise-Induced Building Vibrations, John F. Kennedy International Airport*. National Aeronautics and Space Administration, Langley Research Center, Hampton, Virginia. Report Number 3, Technical Memorandum 78727.
- National Oceanic and Atmospheric Administration [NOAA]. (2013). *Version 4 DMSP-OLS Nighttime Lights Time Series*. National Oceanic and Atmospheric Administration, National Geophysical Data Center, Boulder, Colorado.

- 1 National Security Technologies, LLC. (2016). *Nevada National Security Site*
2 *Environmental Report*. Cathy Wills, ed. Prepared for U.S. Department of Energy,
3 Contract No. DE-AC52-06NA25946. September.
- 4 Natural Resource Conservation Service. (2017). *United States Department of*
5 *Agriculture Web Soil Survey*. Retrieved March 28, 2017, from Natural Resource
6 Conservation Service:
7 <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
- 8 NDEP. (2014). *About the Safe Drinking Water Act*. Retrieved September 30, 2016, from
9 Nevada Division of Environmental Protection, Bureau of Safe Drinking Water:
10 <https://ndep.nv.gov/BSDW/more.htm>, June 11, 2014.
- 11 NDEP. (2016a). *Water Quality Standards Development and Review*. Retrieved
12 September 26, 2016, from Nevada Division of Environmental Protection:
13 <http://ndep.nv.gov/bwqp/stdsw.htm>, May 18, 2016.
- 14 NDEP. (2016b). *Information on NTTR Class II landfill*. Provided to Leidos, Inc. by the
15 Nevada Division of Environmental Protection. October.
- 16 NDOW. (2016a). *Partners in Wildlife*. Retrieved September 21, 2016, from Nevada
17 Department of Wildlife:
18 http://www.ndow.org/Hunt/Specialty_Tags/Partnership_in_Wildlife/
- 19 NDOW. (2016b). *Hunting Unit Information*. Retrieved September 23, 2016, from Nevada
20 Department of Wildlife: http://www.ndow.org/Hunt/Hunting_Units/
- 21 Nellis AFB. (2003). *2003 Nellis Air Force Base Plan 17: Bird-Aircraft Strike Hazard Plan*.
22 Nellis AFB, Nevada. April.
- 23 Nellis AFB. (2010). *Nellis Air Force Base Plan 12 - Hazardous Waste Management*
24 *Plan*. Prepared by the 99 CES/CEA, Nellis AFB, Nevada. February.
- 25 Nellis AFB. (2013). *Seeps, Springs, and Wildlife Water Developments of the South*
26 *Range of the Nevada Test and Training Range*. Nellis Air Force Base, 99
27 CES/CEIEA. June.
- 28 Nellis AFB. (2014a). *Seeps and Springs of the Northwest North Range of the Nevada*
29 *Test and Training Range*. Federal Contract No. W9128F-09-D-0036 DO #0002,
30 Project No. 8068-002-04-01, Work Authorization 007, Document No. 79, Nellis
31 Air Force Base, 99 CES/CEIEA. October.

- 1 Nellis AFB. (2014b). *Seeps and Springs of the Northeast North Range of the Nevada*
2 *Test and Training Range*. Federal Contract No. W912PP-10-D-0021 DO #0008,
3 Project No. 8098-008-01-01, Work Authorization 014, Document No. 79, Nellis
4 Air Force Base, 99 CES/CEIEA. March.
- 5 Nellis AFB. (2014c). *Seeps and Springs of the Southwest North Range of the Nevada*
6 *Test and Training Range*. Federal Contract No. W9128F-09-D-0036 DO #0002,
7 Project No. 8068-002-04-01, Work Authorization 007, Document No. 79, Nellis
8 Air Force Base, 99 CES/CEIEA. September.
- 9 Nellis AFB. (2014d). *Seeps and Springs Database Draft Final Project Report*. Prepared
10 through the U.S. Army Corps of Engineers Contract # W9128F-09-D-0036 DO#
11 0002, Project 8068-002-02-01, Report No. 71-2, Natural Resources Program,
12 Nellis Air Force Base, Nevada, 99 CES/CEIEA. July.
- 13 Nellis AFB. (2014e). *Seeps and Springs of the Southeast North Range of the Nevada*
14 *Test and Training Range*. Federal Contract No. W9128F-09-D-0036 DO #0002,
15 Project No. 8068-002-04-01, Work Authorization 007, Document No. 79, Nellis
16 Air Force Base, 99 CES/CEIEA. October.
- 17 Nellis AFB. (2014f). *Final Report: Wetlands, Seeps and Springs Surveys, Nevada Test*
18 *and Training Range*. Prepared through the U.S. Army Corps of Engineers
19 Contract # W9128F-09-D-0036 DO# 0002, Project 8068-002-02-01, Report No.
20 79, Natural Resources Program, Nellis Air Force Base, Nevada, 99 CES/CEIEA.
21 September.
- 22 Nellis AFB. (2015). *2015 Economic Impact Analysis, Nellis AFB, Creech AFB, and*
23 *Nevada Test and Training Range Economic Impact Analysis*.
- 24 Nevada Audubon Society. (2008). *Nevada's Important Bird Areas Program. Lahontan*
25 *Audubon Society. Brochure*. Retrieved from Nevada Audubon Society:
26 <http://www.nevadaaudubon.org/iba/ibabrochure.pdf>
- 27 Nevada Bat Working Group. (2006). *The Revised Nevada Bat Conservation Plan*. (P. V.
28 Bradley, M. J. O'Farrell, J. A. Williams, & J. E. Newmark, Eds.) Reno, Nevada.
- 29 Nevada Bureau of Mines and Geology. (2014). *The Nevada Mineral Industry 2014*.
30 Nevada Bureau of Mines and Geology, Special Publication MI-2014.
- 31 Nevada Department of Agriculture. (2016). *2016 Economic Analysis of the Food and*
32 *Agriculture Sector*. March.

- 1 Nevada Mining Association. (2016). *Data & Analysis. Query for Nevada, Clark County,*
2 *Nye County, and Lincoln County.* Retrieved August 2, 2016, from Nevada Mining
3 Association: <http://www.nevadamining.org/faq/analysis.php>
- 4 Nevada Natural Heritage Program. (2017). *Species Lists.* Retrieved January 2017, from
5 Department of Conservation and Natural Resources:
6 <http://heritage.nv.gov/species/lists.php>
- 7 NRC/NAS. (1977). *Guidelines for Preparing Environmental Impact Statements on*
8 *Noise.* National Research Council/National Academy of Sciences, Committee on
9 Hearing, Bioacoustics, and Biomechanics.
- 10 Nye County Planning Department. (2009). *Pahrump Valley Desert Tortoise Habitat*
11 *Conservation Plan, Draft.* October 7.
- 12 Nye County Planning Department. (2015). *Nye County Population Estimates Through*
13 *the Third Quarter, 2015.* October 27.
- 14 Outdoor Industry Association. (2017). *The Outdoor Recreation Economy: Nevada.*
15 Retrieved from Outdoor Industry Association:
16 [https://outdoorindustry.org/resource/nevada-outdoor-recreation-economy-state-](https://outdoorindustry.org/resource/nevada-outdoor-recreation-economy-state-report/)
17 [report/](https://outdoorindustry.org/resource/nevada-outdoor-recreation-economy-state-report/)
- 18 Paces et al. (2012). J. B. Paces, P. E. Elliott, J. M. Fenelon, R. J. Lacznia, M. T.
19 Moreo. *Transient Effects on Groundwater Chemical Compositions from Pumping*
20 *of Supply Wells at the Nevada National Security Site, 1951–2008.* U.S.
21 Geological Survey Scientific Investigations Report 2012–5023, 108 p.
- 22 Pagel, J. E., Whittington, D. M., & Allen, G. (2010). *Interim Golden Eagle Inventory and*
23 *Monitoring Protocols and Other Recommendations.* Division of Migratory Bird
24 Management, U.S. Fish and Wildlife Service.
- 25 Pahrump Valley Times. (2015). *Beatty Grand Opening of First Bike Trails May 2.*
26 Retrieved from [http://pvtimes.com/news/beatty-grand-opening-first-bike-trails-](http://pvtimes.com/news/beatty-grand-opening-first-bike-trails-may-2.html)
27 [may-2.html](http://pvtimes.com/news/beatty-grand-opening-first-bike-trails-may-2.html), April 24, 2015.
- 28 Palmer, A. G., Normeyer, N. G., & Roby, D. D. (2003). Nestling provisioning rates of
29 peregrin falcons in interior Alaska. *Journal of Raptor Research*, 38, 9–18.
- 30 Pesek, M. B. (2012). *Nevada stays in the dark - ideal for stargazers.* Retrieved from Las
31 Vegas Review Journal: [http://www.reviewjournal.com/trip-week/nevada-stays-](http://www.reviewjournal.com/trip-week/nevada-stays-dark-ideal-stargazers)
32 [dark-ideal-stargazers](http://www.reviewjournal.com/trip-week/nevada-stays-dark-ideal-stargazers), June 17, 2012.

- Peterson, E. (2008). *International Vegetation Classification Alliances and Associations Occurring in Nevada*. Carson City, Nevada: Nevada Natural Heritage Program.
- PITU. (2017). *Paiute Indian Tribe of Utah*. Retrieved March 2, 2017, from <https://www.utahpaiutes.org>
- Roggenbuck, J. W. (2004). Managing for primitive recreation in wilderness. *International Journal of Wilderness*, 10(3), 21–24.
- Schaefer, D. H., Thiros, S. A., & Rosen, M. R. (2005). *Ground-Water Quality in the Carbonate-Rock Aquifer of the Great Basin, Nevada and Utah, 2003*. U.S. Geological Survey Scientific Investigations Report 2005-5232.
- Sheley et al. (1999). R. L. Sheley, J. J. James, MJ Rinella, D. Blumenthal, and J. M. DiTomaso. Invasive Plant Management on Anticipated Conservation Benefits: A Scientific Assessment. *Conservation Benefits of Rangeland Practices*. Chapter 7.
- Shepherd, J. (2016). Microsoft PowerPoint file with historical Bird-Aircraft Strike Hazard (BASH) data. Provided by MSgt Joshua Shepherd, U.S. Air Force, Nellis AFB, Nevada. November.
- Stoffle et al. (2004). R. W. Stoffle, F. P. Chmara-Huff, K. A. VanVlack, R. S. Toupal. *Puha Flows from It: The Cultural Landscape Study of the Spring Mountain*. The University of Arizona, Tuscon. February.
- Stoffle et al. (2008). R. W. Stoffle, R. W. Arnold, K. A. VanVlack, S. M. O'Meara, J. L. Medwied-Savage. *U-Nav-Kai-Vi Duepeth Tonyav, Volume II: Black Mountain-Thirsty Canyon Traditional Uses of a Volvanic Landscape*. The University of Arizona, Tuscon.
- Sutherland, L. (1990). *Effects of Sonic Boom on Structures, Lecture 3 of Sonic Boom: Prediction and Effects, AIAA Short Course*. October.
- Tarrant, M., Haas, G. E., & Manfredo, M. J. (1995). Factors affecting visitor evaluations of aircraft overflights of wilderness areas. *Society and Natural Resources*, 8(4), 351–360, July.
- Tonopah Solar Energy. (2010). *Crescent Dunes Solar Energy Project Environmental Impact Statement*. Tonopah Solar Energy, LLC.
- U.S. Air Force. (1991). *Special Nevada Report*. Available through NTIS. DE-AC08-88NV10715. Prepared by SAIC, Desert Research Institute, for the U.S.

1 Department of the Air Force, Department of the Army, and Department of
2 Energy. September 23.

3 U.S. Air Force. (1996). *Surface Soil Sampling Report for Ten Representative Nellis Air*
4 *Force Range Bombing Targets*. Nellis Air Force Range, Nevada. Project Number
5 OS005089.

6 U.S. Air Force. (1997a). *Memorandum of Understanding relating to the portion of the*
7 *Nellis Air Force Range that is located within the Desert National Wildlife Range.*
8 Between the U.S. Air Force, Air Combat Command, the Department of the
9 Interior, and the U.S. Fish and Wildlife Service. Signed December 22, 1997.

10 U.S. Air Force. (1997b). *Environmental Effects of Self-Protection Chaff and Flares*. U.S.
11 Air Force, Langley AFB, VA. August.

12 U.S. Air Force. (1998). *Final Water Requirements Study of the Nellis Air Force Range.*
13 September.

14 U.S. Air Force. (1999). *Renewal of the Nellis Air Force Range Land Withdrawal*
15 *Legislative Environmental Impact Statement*. March.

16 U.S. Air Force. (2003). *Preliminary Assessment Report: Nellis Air Force Base, Nevada*
17 *Test and Training Range, 14 Areas of Concern*. February.

18 U.S. Air Force. (2006). *Final Environmental Assessment for Increased Depleted*
19 *Uranium Use on Target 63-10, Nevada Test and Training Range*. Air Combat
20 Command. September.

21 U.S. Air Force. (2010). *Final Integrated Natural Resources Management Plan, Nellis Air*
22 *Force Base/Creech Air Force Base/Nevada Test and Training Range*. 99th Civil
23 Engineering Squadron, Environmental Management Flight. February.

24 U.S. Air Force. (2011). *F-35 Force Development Evaluation and Weapons School*
25 *Beddown Environmental Impact Statement*. Air Combat Command. May.

26 U.S. Air Force. (2012a). *Nellis AFB Integrated Cultural Resources Management Plan,*
27 *Nellis AFB, NV*. September.

28 U.S. Air Force. (2012b). *Air Force Instruction 13-201, Airspace Management*. 21
29 August.

30 U.S. Air Force. (2013a). *Nellis AFB Capital Improvements Program Environmental*
31 *Assessment, Final*. August.

- 1 U.S. Air Force. (2013b). *Creech Air Force Base Capital Improvements Program*
2 *Environmental Assessment, Final*. Air Combat Command. November.
- 3 U.S. Air Force. (2014a). *U.S. Air Force's Report to Congressional Committees: 2025 Air*
4 *Test and Training Range Enhancement Plan*. January.
- 5 U.S. Air Force. (2014b). *Nellis AFB 2013 Greenhouse Gas Emission Inventory Base*
6 *Summary*. U.S. Air Force, Nellis AFB, NV.
- 7 U.S. Air Force. (2014c). *Creech AFB, Nevada 2013 Greenhouse Gas Inventory*
8 *Basewide Summary*. U.S. Air Force, Creech AFB, NV.
- 9 U.S. Air Force. (2014d). *Guide for Environmental Justice Analysis Under the*
10 *Environmental Impact Analysis Process (EIAP)*. November.
- 11 U.S. Air Force. (2014e). *2013 Unique Habitat and Rare Plants*. Prepared by Nellis Air
12 Force Base Natural Resources Team. September.
- 13 U.S. Air Force. (2014f). *Invasive Non-Native Plant Species, Nellis Air Force Base,*
14 *Creech Air Force Base, and the Nevada Test and Training Range, 2013 Final*
15 *Report*. September.
- 16 U.S. Air Force. (2014g). *Powder River Training Complex Ellsworth Air Force Base,*
17 *South Dakota Environmental Impact Statement*. October.
- 18 U.S. Air Force. (2015a). *F-35 Site Activation Task Force VIII briefing*. January.
- 19 U.S. Air Force. (2015b). *Fire Management for the Cedar Peak Area on the Nevada Test*
20 *and Training Range Draft Environmental Assessment*. February.
- 21 U.S. Air Force. (2016a). *Air Force Instruction 32-7070, Air Force Noise Program.*
22 Headquarters U.S. Air Force/Logistics, Engineering, and Force Protection (HQ
23 USAF/A4CIP). April 21.
- 24 U.S. Air Force. (2016b). *Air Emissions Guide for Air Force Mobile Sources*. San
25 Antonio, TX: Air Force Civil Engineer Center.
- 26 U.S. Air Force. (2016c). *Land Use Study of the Nevada Test and Training Range*.
- 27 U.S. Air Force. (2016d). *Special Status Species of the Nevada Test and Training Range*
28 *and Proposed Expansion Areas*. Prepared by Adams Ecology Inc, for Air Force
29 Material Command. December.

- 1 U.S. Air Force. (2016e). *Potential Jurisdictional Waters on the Nevada Test and*
2 *Training Range and Proposed Expansion Alternatives, Draft Report*. Prepared for
3 the U.S. Air Force through the U.S. Army Corps of Engineers, Contract No:
4 W9126G-14-D-0014, Delivery Order No. DS01. Leidos.
- 5 U.S. Air Force. (2016f). *Rare Plants of the Nevada Test and Training Range and*
6 *Proposed Expansion Alternatives*. Prepared for the U.S. Air Force through the
7 U.S. Army Corps of Engineers. Delivery Order No. DS01. Leidos Subcontract No.
8 P010176987. December.
- 9 U.S. Air Force. (2016g). *Report of Continuing Decontamination Nevada Test and*
10 *Training Range, United States Air Force (Calendar Years 1999-2016)*. Nellis
11 AFB, Nevada.
- 12 U.S. Air Force. (2016h). *Fiscal Year 2015 Report of Continuing Decontamination*
13 *Nevada Test and Training Range*. February.
- 14 U.S. Air Force. (2016i). *Air Force Instruction 91-202, The U.S. Air Force Mishap*
15 *Prevention Program*. February.
- 16 U.S. Air Force. (2016j). *Aircraft Flight Mishap Histories*. Retrieved October 2016, from
17 U.S. Air Force Safety Center: <http://www.safety.af.mil>
- 18 U.S. Air Force. (2017a). *Roadless Areas on the Nevada Test and Training Range and*
19 *Proposed Expansion Alternatives. Final Report*. Nellis Air Force Base,
20 Department of the Air Force. April.
- 21 U.S. Air Force. (2017b). *Plant Community Mapping for the Nevada Test and Training*
22 *Range and Proposed Expansion Alternatives*. Prepared for U.S. Air Force, Nellis
23 Air Force Base by Adams Ecology Inc.
- 24 U.S. Air Force. (2017c). *Key Habitats of the Nevada Test and Training Range and*
25 *Potential Expansion Alternatives, Draft Report*. Prepared by Adams Ecology,
26 Inc., through the U.S. Army Corps of Engineers Contract #W9126G-14-D-014,
27 Delivery Order No. DS01, Leidos Subcontract No: P010176987. January.
- 28 U.S. Air Force. (2017d). *Migratory Birds on the Nevada Test and Training Range and*
29 *Proposed Expansion Alternatives*. Prepared by Adams Ecology, Inc. for U.S. Air
30 Force, Nellis Air Force Base.

- 1 U.S. Air Force. (2017e). *Golden Eagles and Raptors on the Nevada Test and Training*
2 *Range and Proposed Expansion Alternatives*. Adams Ecology, Inc. prepared for
3 U.S. Air Force.
- 4 U.S. Air Force. (2017f). *Large Mammal Report for the Nevada Test and Training Range*
5 *and Proposed Expansion Areas*. Adams Ecology, Inc. prepared for U.S. Air
6 Force, Nellis Air Force Base.
- 7 U.S. Air Force. (2017g). *Special Status Species Habitat Range Model for the Nevada*
8 *Test and Training Range and Proposed Expansion Alternatives*. Prepared by
9 Adams Ecology Inc. for U.S. Air Force, Nellis Air Force Base.
- 10 U.S. Air Force. (2017h). *Wetlands, Floodplains, and Seeps and Springs of the Nevada*
11 *Test and Training Range and Proposed Expansion Alternatives - Final Report*.
12 Prepared by Adams Ecology, Inc. under contract with S&B Christ Consulting, for
13 the U.S. Air Force through the U.S. Army Corps of Engineers, Contract #
14 W9126G-14-D-0014, Delivery Order No. DS01, Leidos Subcontract No.
15 P010176987. May.
- 16 U.S. Air Force. (2017i). *Desert Tortoise and its Habitat on the Nevada Test and Training*
17 *Range and Proposed Expansion Alternatives*. Adams Ecology, Inc. prepared for
18 U.S. Air Force, Nellis Air Force Base.
- 19 U.S. Air Force. (2017j). *A review of the desert tortoise projects conducted on the*
20 *Nevada Test and Training Range and Proposed Expansion Alternatives*. Adams
21 Ecology, Inc. prepared for U.S. Air Force, Nellis Air Force Base.
- 22 U.S. Air Force. (2017k). *Desert Tortoise Habitat Model Report for the Nevada Test and*
23 *Training Range and Proposed Expansion Alternatives*.
- 24 U.S. Air Force. (2017l). *Energy and Mineral Resource Assessment Update: Nevada*
25 *Test and Training Range Clark, Nye and Lincoln Counties, Nevada*. Prepared by
26 Golder Associates, Inc. December.
- 27 U.S. Air Force. (2017m). *Final Water Requirements Study of the Nevada Test and*
28 *Training Range*. prepared by S&B Christ Consulting, LLC under contract with
29 Leidos for the U.S. Air Force. March.
- 30 U.S. Air Force. (2017n). *Contamination Analysis of the Nevada Test and Training*
31 *Range, Final*. prepared by S&B Christ Consulting, LLC under contract with
32 Leidos for the U.S. Air Force. January.

- 1 U.S. Air Force. (2017o). *Final Environmental Impact Statement for the Standup and*
2 *Beddown of Tactical Air Support Squadron at Nellis AFB.*
- 3 U.S. Army. (2007). *Army Regulation 200-1, Environmental Quality. Environmental*
4 *Protection and Enhancement.* Headquarters Department of the Army
5 Washington, D.C.
- 6 U.S. Department of Transportation [USDOT]. (2016). *RCNM - Construction Noise -*
7 *Noise- Environment - FHWA.* Retrieved December 21, 2016, from U.S.
8 Department of Transportation:
9 https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/
- 10 University of Nevada. (1995). *Federal and State Land-Based Payments in Nevada.*
11 University Center for Economic Development, Technical Report UCED 95-02
12 prepared by Randall D. Mead, Janet C. Baker, Natalie J. Little, and Thomas R.
13 Harris.
- 14 USACE. (1987). *Wetlands Delineation Manual.* U.S. Army Corps of Engineers.
- 15 USACE. (2008). *Regional Supplement to the Corps of Engineers Wetland Delineation*
16 *Manual: Arid West Region (Version 2.0).* Ed. J. S. Wakelely, R. W. Lichvar and
17 C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Corps of Engineers
18 Research and Development Center.
- 19 USCB. (2014a). *ACS Demographic and Housing Estimates.* United States Census
20 Bureau, American Community Survey 5-Year Estimates: Query for Clark County,
21 Lincoln County, Nye County, Nevada, Iron County, Washington County, Utah,
22 United States, Census Tract 59.02, Census Tract 9502, Census Tract 9603,
23 9604.01, and 9805.
- 24 USCB. (2014b). *Poverty Status in the Past 12 Months.* American Community Survey 5-
25 Year Estimates: Query for Clark County, Lincoln County, Nye County, Nevada,
26 Iron County, Washington County, Utah, United States, Census Tract 59.02,
27 Census Tract 9502, Census Tract 9603, 9604.01, and 9805.
- 28 USCB. (2016). *Annual Estimates of the Resident Population: April 1, 2010 to July 1,*
29 *2015. 2015 Population Estimates.* United States Census Bureau. Release dates
30 of May 2016. Accessed on October 4.
- 31 USDA. (1982). *Soil Survey of the Las Vegas Valley Area Nevada.* Soil Conservation
32 Service, United States Department of Agriculture.

- 1 USDA. (2004). *2002 Census of Agriculture, Nevada State and County Data*. Volume 1,
2 Geographic Area Series, Part 28, AC-02-A-28, National Agricultural Statistics
3 Service, U.S. Department of Agriculture. June.
- 4 USDA. (2014). *2012 Census of Agriculture, Nevada State and County Data*. Geographic
5 Area Series, U.S. Department of Agriculture, Volume 1, Part 28. Table 11. Cattle
6 and Calves – Inventory and Sales: 2012 and 2007.
- 7 USFWS. (1971). *Desert NWR Wilderness Proposal, Desert National Wildlife Refuge*
8 *Complex Clark County, Nevada*. U.S. Fish and Wildlife Service.
- 9 USFWS. (1994). Determination of Critical Habitat for the Mojave Population of the
10 Desert Tortoise: Final Rule. *Federal Register*, Volume 59, Number 26, 5820–
11 5866.
- 12 USFWS. (2008a). *610 FW1: General Overview of Wilderness Stewardship Policy*. U.S.
13 Fish and Wildlife Service, Division of Natural Resources.
- 14 USFWS. (2008b). *The USFWS Service Manual*. U.S. Fish and Wildlife Service Division
15 of Natural Resources. November 7.
- 16 USFWS. (2009). *Desert National Wildlife Refuge Complex, Ash Meadows, Desert,*
17 *Moapa Valley, and Pahrangat National Wildlife Refuges, Final Comprehensive*
18 *Conservation Plan and Environmental Impact Statement*. U.S. Fish and Wildlife
19 Service, Pacific Southwest Region. August.
- 20 USFWS. (2011). *Final Revised Recovery Plan for the Mojave Population of the Desert*
21 *Tortoise (Gopherus agassizii)*. Region 8, Pacific Southwest Region, U.S. Fish
22 and Wildlife Service, Sacramento, California.
- 23 USFWS. (2012). *Wilderness Character Monitoring on the National Wildlife Refuges:*
24 *Natural Resource Program Center*. U.S. Fish and Wildlife Service. January.
- 25 USFWS. (2013). *2011 National Survey of Fishing, Hunting, and Wildlife-Associated*
26 *Recreation, Nevada*. U.S. Fish and Wildlife Service. December.
- 27 USFWS. (2016a). *Programmatic Environmental Impact Statement for Eagle Rule*
28 *Revision*. U.S. Fish and Wildlife Service, U.S. Department of the Interior.
29 December.
- 30 USFWS. (2016b). *Range-wide Monitoring of the Mojave Desert Tortoise (Gopherus*
31 *agassizii): 2015 and 2016 Annual Reporting*. Reno, Nevada: Report by the
32 Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service.

- 1 USFWS. (2017a). *Endangered Species*. Retrieved January 2017, from U.S. Fish and
2 Wildlife Service: <https://www.fws.gov/endangered/>
- 3 USFWS. (2017b). *Code of Federal Register, Eagle Permits*. U.S. Fish and Wildlife
4 Service. Code of Federal Register.
- 5 USGS. (2008). *United States National Seismic Hazards Map*. United States Geological
6 Survey, Fact Sheet 2008-3017. April.
- 7 USGS. (2009). *Ground Water Atlas of the United States. California, Nevada. HA 730-B*.
8 Retrieved October 11, 2016, from U.S. Geological Survey:
9 http://pubs.usgs.gov/ha/ha730/ch_b/B-text2.html, February 9, 2009.
- 10 USGS. (2013a). *Water Quality*. Retrieved October 7, 2016, from U.S. Geological
11 Survey, Nevada Water Science Center:
12 <http://nevada.usgs.gov/water/qw/waterquality.htm>, January 11, 2013.
- 13 USGS. (2013b). *Quality of Groundwater*. Retrieved October 12, 2016, from U.S.
14 Geological Survey: <http://pubs.usgs.gov/gip/gw/quality.html>, January 10, 2013.
- 15 Walker, M., & Montecinos, C. (2007). *Arsenic in Drinking Water: Issues Associated with*
16 *Revising the Standard*. University of Nevada. February 22.
- 17 Weisenberger, M. P. (1996). Effects of Simulated Jet Aircraft on Heart Rate and
18 Behavior of Desert Ungulates. *Journal of Wildlife Management*, 60(52), 52–61.
- 19 Weston Solutions, Inc. (2004). *Limited Field Study Report, Munitions Constituent*
20 *Migration at Operational Ranges*. December.
- 21 Weston Solutions, Inc. (2007). *Final Range Assessment Report Munitions Constituent*
22 *Migration on Operational Ranges, Nevada Test and Training Range, Nevada*.
23 September.
- 24 WildEarth Guardians. (2015). *Petition to list the Joshua tree (Yucca brevifolia) under the*
25 *Endangered Species Act*. Denver, Colorado.
- 26 Zedeno et al. (2005). M. N. Zedeno, F. P. Chmara-Huff, A. K. Carrol, R. S. Toupal.
27 *From Red Spring to Cane Spring: Landscapes of Movement along the Greater*
28 *Belted Range*. The University of Arizona, Tuscon. May.

This page is intentionally blank.

6. LIST OF PREPARERS AND CONTRIBUTORS

Henry McLaurine, Sr. NEPA Project Manager, Leidos
Project Manager; Description of Proposed Action and Alternatives development
M.S., Biology, Stephen F. Austin State University, 1994
B.S., Environmental Science 1991
Years of Experience: 23

Kevin Akstulewicz, Environmental Scientist, Leidos
Deputy Project Manager
B.S., Environmental Science & Policy, University of West Florida, 1999
Years of Experience: 18

Amy Sands, NEPA Planning Specialist, Leidos
Technical Specialist
M.A.S., Environmental Policy and Management, University of Denver, 2007
B.S., Environmental Science, University of North Carolina at Wilmington, 2002
Years of Experience: 11

Koffi Amefia
B.S., Electrical Engineering
M.S., Civil Environmental Engineering
Years of Experience: 16

Brad Boykin, Environmental Scientist, Leidos
Air Quality; Noise
M.S., Biotechnology, Texas A&M University, College Station, 2004
B.S., Biomedical Science, Texas A&M University, College Station, 2002
Years of Experience: 12

Lauren Brown, Staff Biologist, Leidos
Biological Resources
B.S., Ecology and Systematic Biology, California Polytechnic State University, San Luis Obispo, 1991
Years of Experience: 25

Jennifer Combs, Editing Specialist, Leidos
Copyediting
B.S., Communications, Journalism, University of Tennessee, 1987
Years of Experience: 28

1 Ronald R. Combs, Environmental Scientist, Leidos
2 Water Resources

3 M.S., Biology, University of West Florida, 2006

4 B.S., Biology, San Diego State University, 2000

5 B.S., Business Administration, University of Tennessee, 1990

6 Years of Experience: 14

8 Michael Deacon, Environmental Scientist, Leidos

9 Land Use; Recreation; Transportation

10 B.S., Environmental Studies, Utah State University, 1990

11 B.S., Environmental Health, East Tennessee State University, 1980

12 Years of Experience: 25

14 Luis Diaz, Environmental Engineer, Leidos

15 Hazardous Materials and Solid Wastes; Health and Safety

16 M.S., Environmental Engineering, University of South Florida, 1985

17 Years of Experience: 21

19 Heather C. Gordon, Environmental Analyst, Leidos

20 Visual Resources

21 M.S., Geography, University of New Mexico, 2007

22 B.A., Environmental Studies and Planning, California State University, Sonoma, 1996

23 Years of Experience: 20

25 Gregory L. Kesler, Senior Military Planner, Leidos

26 Airspace

27 M. Ed., Human Resource Education, Boston University, 1993

28 B.S., Biology, University of Southern Mississippi, 1985

29 Years of Experience: 31

31 Jason M. Koralewski, Environmental Scientist, Leidos

32 Cultural Resources; Earth Resources

33 M.A., Anthropology, The Ohio State University, 2002

34 M.L.S., Liberal Arts, spec. in Archaeology, The University of Toledo, 2000

35 B.A., Anthropology, The University of Toledo, 1996

36 Register of Professional Archaeologist

37 Years of Experience: 21

39 Geral Long, Aircraft Noise Analyst, Leidos

40 Noise

41 M.S., Biology, University of Texas, 1979

42 B.S., Biology, 1969

43 Years of Experience: 35

1 Pamela C. McCarty, Environmental Analyst, Leidos
2 Socioeconomics; Environmental Justice
3 M.S., Industrial and Systems Engineering, University of Florida, 2011
4 M.A., Applied Economics, University of Central Florida, 2004
5 B.S., Business Administration, University of Central Florida, 2002
6 Years of Experience: 10
7
8 Amanda C. Robydek, Environmental Scientist, Leidos
9 Wilderness and Wilderness Study Areas
10 B.S., Environmental Science, University of Florida, 2002
11 Years of Experience: 10
12
13 Tara Schoenwetter, Senior Biologist, Leidos
14 Biological Resources
15 B.A., Biology, University of California, Irvine, 1999
16 M.S., Applied Ecology/Conservation Biology, Frostburg State University, 2005
17 Ph.D., Ecology, Lincoln University, 2012
18 Years of Experience: 14
19
20 Tara Utsey, Sr. Publications Specialist, Leidos
21 Document Publication Team Lead
22 B.A., Liberal Arts, DePaul University, Chicago, 2003
23 Years of Experience: 23

This page is intentionally blank.

7. LIST OF REPOSITORIES

University of Nevada, Las Vegas Library
4505 South Maryland Parkway
Box 457001
Las Vegas, NV 89154

University of Nevada, Reno Library
Mathewson-IGT Knowledge Center
1664 N. Virginia Street
Mailstop 322
Reno, NV 89557

Indian Springs Library
715 Gretta Lane
Indian Springs, NV 89018

Reno Downtown Library
301 S. Center Street
Reno, NV 89501

Caliente Branch Library
100 Depot Avenue
P.O. Box 306
Caliente, NV 89008

Carson City Library
900 North Roop Street
Carson City, NV 89701

Las Vegas-Clark County Library District
833 Las Vegas Blvd. North
Las Vegas, NV 89101

Beatty Library District
400 North 4th Street
Beatty, NV 89003

Pahrump Community Library
701 East Street
Pahrump, NV 89048

- 1 Lincoln County Library
- 2 63 Main Street
- 3 Pioche, NV 89043

- 4 Amargosa Valley Library
- 5 829 E. Farm Road
- 6 HC 69 Box 401T
- 7 Amargosa Valley, NV 89020

- 8 Tonopah Library
- 9 167 South Central Street
- 10 Tonopah, NV 89049

- 11 State Bureau of Land Management
- 12 1340 Financial Blvd.
- 13 Reno, NV 89502

- 14 Nye County Commissioners Office
- 15 101 Radar Road
- 16 P.O. Box 153
- 17 Tonopah, NV 89049

8. INDEX

- 1 Air Quality, 1-31, 2-34, 2-44, 3-24–3-39, 3-245,
2 3-288–3-289, 3-308, 3-309, 4-13, 4-14–4-16,
3 4-21
- 4 attainment, 1-31, 3-24, 3-25, 3-26, 3-29, 3-30,
5 3-31, 4-15
- 6 climate change, 1-31, 1-32, 3-29
- 7 greenhouse gas (GHG), 1-31, 3-27–3-28
- 8 National Ambient Air Quality Standards
9 (NAAQS), 1-31, 3-24, 3-25, 3-26, 3-29
- 10 Airspace, 1-2, 1-3, 1-6, 1-9, 1-11–1-12, 1-16,
11 1-18, 1-21–1-22, 1-30, 1-31, 2-2–2-3, 2-14,
12 2-15, 2-19, 2-20, 2-33, 2-34, 3-1–3-8, 3-9,
13 3-10, 3-11, 3-18, 3-19–3-20, 3-21, 3-26, 3-30,
14 3-41, 3-44, 3-65, 3-67, 3-73, 3-76, 3-78, 3-79,
15 3-85, 3-111, 3-116, 3-129, 3-130, 3-163,
16 3-167, 3-168, 3-172, 3-175, 3-176, 3-177,
17 3-181, 3-182, 3-189, 3-197, 3-264, 3-274,
18 3-279, 3-280, 3-281, 3-284, 3-287, 3-309,
19 4-3, 4-12, 4-18, 4-21, 4-24, 4-25, 4-31
- 20 Bureau of Land Management (BLM), 1-1, 1-2,
21 1-29, 1-30, 2-13, 2-14, 2-15, 2-16, 2-19, 2-22,
22 2-23, 2-26, 2-27, 2-31, 2-32, 2-33, 2-34, 2-49,
23 3-39, 3-40, 3-41, 3-42, 3-43, 3-45, 3-48, 3-51,
24 3-52, 3-53, 3-57, 3-58, 3-60, 3-61, 3-63, 3-64,
25 3-65, 3-67, 3-70, 3-71, 3-73, 3-77, 3-78, 3-79,
26 3-92, 3-98, 3-99, 3-100, 3-102, 3-106, 3-107,
27 3-108, 3-109, 3-110, 3-137, 3-146, 3-147,
28 3-150, 3-151, 3-162, 3-173, 3-174, 3-179,
29 3-181, 3-185, 3-196, 3-203, 3-204, 3-209,
30 3-210, 3-217, 3-218, 3-229, 3-237, 3-238,
31 3-239, 3-241, 3-247, 3-263, 3-264, 3-267,
32 3-268, 3-276, 3-279, 3-280, 3-286, 3-291,
33 3-293, 3-294, 3-294, 3-298, 3-301, 3-303,
34 3-305, 3-307, 3-312, 4-2, 4-8, 4-9, 4-10, 4-16,
35 4-25, 4-27
- 36 Cultural Resources, 1-29, 1-32, 2-13, 2-34, 2-37,
37 2-39, 2-43, 2-50, 3-60, 3-180–3-196, 3-265,
38 3-299–3-301, 3-314, 4-2, 4-13, 4-24–4-26
- 39 archeological resources/sites, 1-32, 2-35,
40 3-180, 3-184–3-186, 3-189, 3-190, 3-192,
41 3-193, 3-194
- 42 Area of Potential Effects (APE), 3-180, 3-181,
43 3-184, 3-187, 3-188, 4-25
- 44 Historic Property, 3-180, 3-188, 3-191, 3-192,
45 3-193, 3-195, 4-25
- 46 National Historic Preservation Act (NHPA),
47 1-32, 2-35, 2-43, 3-180, 3-184, 3-185,
48 3-187, 3-188, 3-191, 3-193, 3-194, 3-195,
49 3-299, 3-300, 3-300, 3-307, 3-315, 4-24,
50 4-25, 4-26
- 51 sacred sites, 1-32, 3-60, 3-180, 3-181, 3-182,
52 3-183, 3-192, 3-193, 3-299, 3-314, 4-24
- 53 Section 106, 1-32, 2-35, 3-184, 3-185, 3-187,
54 3-188, 3-192, 3-193, 3-194, 3-195, 3-299,
55 3-300, 3-300, 3-315, 4-24, 4-25, 4-26
- 56 State Historic Preservation Officer (SHPO),
57 2-36, 2-37, 2-50, 3-187, 3-188, 3-192,
58 3-195, 4-21, 4-24, 4-25, 4-26
- 59 traditional cultural properties, 3-180, 3-181,
60 3-182, 3-183, 3-192, 3-193, 3-194, 3-299,
61 3-314, 4-25
- 62 tribes/tribal, 1-2, 1-32, 2-13, 2-50, 3-112,
63 3-121, 3-180, 3-181–3-184, 3-181, 3-187,
64 3-188, 3-192
- 65 Desert National Wildlife Range (DNWR), 1-5,
66 1-8, 1-9, 1-10, 1-16, 1-17, 1-23, 1-26, 1-29,
67 1-30, 1-31, 1-33, 2-13, 2-14, 2-21, 2-26, 2-27,
68 2-28, 2-31, 2-33, 3-7, 3-39, 3-40, 3-41, 3-42,
69 3-44, 3-45, 3-48, 3-50, 3-51, 3-52, 3-53, 3-55,
70 3-58, 3-59, 3-61, 3-62, 3-63, 3-65, 3-70, 3-74,
71 3-76, 3-78, 3-82, 3-84, 3-87, 3-88, 3-89, 3-90,
72 3-99, 3-106, 3-107, 3-108, 3-136, 3-138,
73 3-142, 3-159, 3-171, 3-176, 3-178, 3-179,
74 3-200, 3-210, 3-217, 3-218, 3-236, 3-247,
75 3-271, 3-277, 3-281, 3-285, 3-286, 3-289,
76 3-291, 3-292, 3-298, 3-302, 3-302, 3-303,
77 3-307, 3-308, 3-310, 3-311, 4-16, 4-26, 4-30,
78 4-32
- 79 Earth Resources, 1-32, 2-34, 2-50, 3-97–3-99,
80 3-196–3-218, 3-301–3-303, 3-315–3-316,
81 4-26–4-27
- 82 erosion, 2-34, 2-40, 2-43, 2-46, 2-50, 3-53,
83 3-168, 3-197, 3-202, 3-203, 3-209, 3-212,
84 3-213, 3-214, 3-215, 3-216, 3-218, 3-233,
85 3-234, 3-235, 3-236, 3-237, 3-238, 3-316,
86 4-22, 4-26, 4-27, 4-28
- 87 geological resources, 1-32, 3-66, 3-130,
88 3-196, 3-197–3-200, 3-203, 3-209, 3-212,
89 3-214, 3-215, 3-216, 3-217, 3-218, 3-248,
90 3-301–3-303, 3-315, 3-316
- 91 ground disturbance, 1-9, 1-16, 2-27, 2-36,
92 2-45, 2-46, 2-47, 2-49, 2-50, 2-51, 3-6,
93 3-14, 3-19, 3-21, 3-22, 3-28, 3-31, 3-36,
94 3-37, 3-58, 3-59, 3-64, 3-65, 3-79, 3-80,
95 3-81, 3-84, 3-87, 3-89, 3-106, 3-121,
96 3-122, 3-123, 3-127, 3-128, 3-135, 3-162,

1	3-165, 3-169, 3-170, 3-171, 3-172, 3-174,	51	3-255, 3-256, 3-258, 3-259, 3-262, 3-263,
2	3-176, 3-190, 3-192, 3-193, 3-194, 3-202,	52	3-296, 3-304, 3-314, 3-317, 4-22, 4-29
3	3-213, 3-214, 3-215, 3-216, 3-217, 3-223,	53	residues, 2-52, 3-202, 3-231, 3-232, 3-234,
4	3-233, 3-234, 3-235, 3-236, 3-237, 3-257,	54	3-236, 3-240, 3-241, 3-243, 3-244, 3-245,
5	3-260, 3-261, 3-262, 3-277, 3-278, 3-285,	55	3-246, 3-257, 3-258, 3-259
6	3-287, 3-288, 3-289, 3-290, 3-291, 3-292,	56	solid waste management unit (SWMU),
7	3-294, 3-295, 3-296, 3-298, 3-299, 3-300,	57	3-243, 3-263
8	3-300, 3-301, 3-302, 3-303, 3-304, 3-306,	58	unexploded ordnance (UXO), 1-18, 1-26,
9	3-309, 3-313, 3-314, 3-315, 3-316, 4-17,	59	1-33, 3-231, 3-240, 3-243, 3-244, 3-258,
10	4-21, 4-22, 4-24, 4-26, 4-27, 4-28	60	3-275, 3-280
11	metals, 2-52, 3-204, 3-210, 3-217, 3-231,	61	Health & Safety, 2-43
12	3-232, 3-234, 3-236, 3-240, 3-241, 3-244,	62	Automated Terminal Information System
13	3-259, 3-274, 3-303, 3-304, 3-305	63	(ATIS), 3-273
14	minerals, 3-196, 3-204–3-209, 3-210, 3-227,	64	Land Use, 1-7, 1-13, 1-26, 1-29, 1-33, 1-34, 2-3,
15	4-32	65	2-31, 2-32, 2-34, 2-43, 2-45–2-46, 2-51, 3-9,
16	paleontological resources, 3-196, 3-211–	66	3-17, 3-21, 3-23, 3-38, 3-39–3-65, 3-92,
17	3-212, 3-213, 3-214, 3-215, 3-216, 3-218,	67	3-100, 3-110, 3-121, 3-171, 3-179, 3-218,
18	3-301–3-303, 3-301, 3-315, 3-316	68	3-238, 3-249, 3-263, 3-280, 3-286, 3-287,
19	seismic/fault, 3-190, 3-197–3-198, 3-210,	69	3-289–3-291, 3-296, 3-298, 3-303, 3-305,
20	3-212, 3-217	70	3-307, 3-308, 3-310–3-311, 4-10, 4-13, 4-14,
21	soils, 2-46, 2-50, 3-130, 3-135, 3-139, 3-141,	71	4-16–4-18, 4-19, 4-20, 4-21, 4-23, 4-31, 4-32
22	3-147, 3-158, 3-171, 3-196, 3-200–3-203,	72	Alamo areas, 2-15, 2-16, 2-26, 3-7, 3-21,
23	3-212, 3-213, 3-214, 3-215, 3-216, 3-218,	73	3-23, 3-36, 3-44, 3-48, 3-55, 3-59, 3-63,
24	3-221, 3-231, 3-234, 3-247, 3-248, 3-259,	74	3-76, 3-85, 3-86, 3-87, 3-89, 3-106, 3-127,
25	3-274, 3-301–3-303, 3-301, 3-315, 3-316,	75	3-136, 3-138, 3-142, 3-159, 3-160, 3-172,
26	4-2, 4-26, 4-27	76	3-176, 3-184, 3-186, 3-193, 3-194, 3-197,
27	volcanic, 3-130, 3-197, 3-198, 3-200, 3-202,	77	3-200, 3-203, 3-210, 3-211, 3-212, 3-215,
28	3-207, 3-209, 3-211, 3-226, 3-227, 3-228	78	3-224, 3-226, 3-229, 3-230, 3-235, 3-237,
29	Environmental Justice, 3-111–3-129, 3-295–	79	3-261, 3-278, 3-281, 3-285, 3-300, 3-307,
30	3-296, 3-313, 4-20–4-21	80	3-309, 3-311, 3-315, 4-30, 4-31
31	Hazardous Materials/Waste, 1-7, 1-33, 3-212,	81	Beatty VFW Events, 3-45, 3-61, 3-108, 3-290,
32	3-238–3-264, 3-305, 3-317, 4-29–4-30	82	3-307, 4-7
33	areas of concern (AOCs), 3-242, 3-243,	83	Best in the Desert Race, 3-45, 3-61, 3-108,
34	3-257, 3-263	84	3-290, 4-8
35	contamination, 1-33, 2-2, 2-32, 3-38, 3-65,	85	grazing, 1-33, 2-14, 2-27, 2-31, 2-46, 2-47,
36	3-92, 3-110, 3-111, 3-162, 3-172, 3-202,	86	3-23, 3-38, 3-39, 3-40, 3-41, 3-42, 3-43,
37	3-212, 3-228, 3-230, 3-232, 3-233, 3-236,	87	3-44, 3-59, 3-60, 3-64, 3-77, 3-92, 3-97,
38	3-238, 3-241, 3-242, 3-243, 3-245, 3-246,	88	3-99, 3-106, 3-109, 3-110, 3-139, 3-164,
39	3-247, 3-248–3-254, 3-258, 3-259, 3-271,	89	3-166, 3-175, 3-178, 3-179, 3-202, 3-281,
40	3-295, 3-296, 3-304, 3-314	90	3-290, 3-291, 3-293, 3-294, 3-294, 3-298,
41	depleted uranium, 1-33, 3-232, 3-233, 3-244,	91	3-310, 3-312, 3-313, 4-23
42	3-245, 3-246, 3-258	92	Herd Management Areas (HMAs), 2-13, 3-45,
43	Environmental Restoration Program (ERP),	93	3-48, 3-63, 3-290, 3-290, 3-307, 3-310
44	3-238, 3-239, 3-241, 3-242, 3-257, 3-263	94	hunting, 1-33, 2-13, 2-51, 3-44, 3-45, 3-48,
45	Federal Facility Agreement and Consent	95	3-59, 3-60, 3-61, 3-62, 3-63, 3-74, 3-76,
46	Order (FFACO), 3-231, 3-248, 3-249,	96	3-84, 3-86, 3-97, 3-98, 3-99, 3-107, 3-184,
47	3-264	97	3-289–3-291
48	releases/spills, 1-33, 2-35, 3-172, 3-177,	98	hunting units, 3-44, 3-45, 3-48, 3-50, 3-61,
49	3-202, 3-212, 3-216, 3-237, 3-239, 3-240,	99	3-63, 3-99, 3-290, 3-310
50	3-241, 3-242, 3-243, 3-244, 3-247, 3-248,	100	mining, 1-32, 1-34, 1-35, 2-31, 2-32, 2-46,
		101	2-51, 3-23, 3-38, 3-39, 3-41, 3-42, 3-44,

1	3-51, 3-60, 3-64, 3-70, 3-77, 3-92, 3-93,	52	Nevada Department of Wildlife (NDOW), 1-2,
2	3-95, 3-109, 3-110, 3-164, 3-169, 3-175,	53	1-32, 2-13, 2-14, 2-37, 2-48, 3-44, 3-45, 3-48,
3	3-178, 3-181, 3-182, 3-203, 3-204, 3-205,	54	3-50, 3-59, 3-60, 3-61, 3-62, 3-63, 3-99,
4	3-207, 3-209, 3-210, 3-217, 3-218, 3-281,	55	3-132, 3-137, 3-138, 3-146, 3-290, 3-307,
5	3-288, 3-290, 3-290, 3-291, 3-294, 3-298,	56	3-310
6	3-302, 3-303, 3-310, 3-316, 4-4, 4-23, 4-26	57	Nevada Division of Environmental Protection
7	Nevada Wild Horse Range, 3-41, 3-45, 3-46,	58	(NDEP), 2-34, 2-35, 3-24, 3-214, 3-216,
8	3-137	59	3-220, 3-224, 3-241, 3-242, 3-243, 3-247,
9	North Range, 1-2, 1-4, 1-6, 1-7–1-8, 1-13,	60	3-248, 3-254, 3-255, 3-257, 3-258, 4-26
10	1-17, 1-18, 1-26, 1-31, 2-5, 2-6, 2-14, 2-20,	61	Nevada National Security Site (NNSS), 1-5,
11	2-21, 2-33, 3-7, 3-25, 3-41, 3-42, 3-45,	62	1-11, 2-6, 2-12, 2-14, 2-17, 3-41, 3-55, 3-228,
12	3-52, 3-58, 3-59, 3-63, 3-71, 3-73, 3-74,	63	3-230, 3-231, 3-249, 3-268
13	3-79, 3-105, 3-130, 3-132, 3-133, 3-135,	64	Noise, 1-33, 1-34, 2-40, 2-43, 2-44, 2-51, 2-52,
14	3-136, 3-137, 3-138, 3-139, 3-142, 3-147,	65	3-6, 3-8–3-24, 3-56, 3-73, 3-74, 3-75, 3-76,
15	3-151, 3-153, 3-154, 3-156, 3-158, 3-171,	66	3-80, 3-81, 3-83, 3-84, 3-85, 3-86, 3-91,
16	3-173, 3-179, 3-196, 3-197, 3-221, 3-223,	67	3-114, 3-115, 3-116, 3-117, 3-118, 3-119,
17	3-226, 3-228, 3-231, 3-233, 3-242, 3-243,	68	3-120, 3-121, 3-122, 3-123, 3-124, 3-125,
18	3-246, 3-254, 3-265, 3-268, 3-276, 3-279,	69	3-126, 3-127, 3-128, 3-129, 3-164, 3-165,
19	3-281, 4-18, 4-30	70	3-166, 3-169, 3-171, 3-175, 3-177, 3-178,
20	Oasis Valley, 3-45, 3-53, 3-61, 3-98, 3-183,	71	3-183, 3-190, 3-193, 3-287–3-288, 3-292,
21	3-198, 3-307, 4-6, 4-7, 4-16, 4-25, 4-26,	72	3-293, 3-295, 3-296, 3-297, 3-298, 3-309,
22	4-27	73	3-312, 3-313, 4-13–4-14, 4-18, 4-20, 4-21,
23	Off-Highway Vehicles (OHV), 1-33, 1-34,	74	4-31
24	2-46, 3-40, 3-45, 3-47, 3-48, 3-52, 3-53,	75	C-weighted day-night average sound level
25	3-55, 3-61, 3-62, 3-98, 3-107, 3-290,	76	(CDNL), 3-9, 3-10, 3-11, 3-14, 3-17, 3-20,
26	3-290, 3-307, 3-310, 3-312, 4-7, 4-16,	77	3-21, 3-116, 3-121, 3-122, 3-123, 3-124,
27	4-17, 4-20, 4-21	78	3-127, 3-128, 3-295, 3-307, 3-313
28	Point Bravo, 3-44, 3-241	79	C-weighted decibel, 3-9, 3-10, 3-14, 3-17,
29	right-of-way, 1-33, 2-26, 3-40, 3-41, 3-42,	80	3-20, 3-124, 3-307
30	3-70, 3-76, 3-78, 3-109, 3-294, 3-312, 4-9,	81	day-night average sound level (DNL), 3-8,
31	4-10, 4-27	82	3-10, 3-11, 3-16, 3-17, 3-116, 3-121,
32	Silver Flag Alpha, 3-44, 3-241	83	3-123, 3-127, 3-129, 3-295, 3-307, 3-313,
33	South Range, 1-2, 1-4, 1-6, 1-7, 1-8–1-11,	84	4-20, 4-21
34	1-12, 1-13, 1-16, 1-17, 1-18, 1-21, 1-26,	85	maximum sound level (Lmax), 3-9, 3-10,
35	1-31, 2-5, 2-6, 2-14, 2-17, 2-19, 2-20, 2-21,	86	3-16, 3-22, 3-74
36	2-33, 2-34, 2-51, 2-52, 3-7, 3-20, 3-25,	87	sonic boom, 1-33, 1-34, 3-9, 3-10, 3-11, 3-17,
37	3-26, 3-41, 3-42, 3-50, 3-52, 3-55, 3-58,	88	3-18, 3-20, 3-74, 3-164, 3-190, 3-212,
38	3-59, 3-60, 3-63, 3-70, 3-71, 3-73, 3-74,	89	3-287, 3-309, 4-24
39	3-77, 3-79, 3-81, 3-82, 3-83, 3-84, 3-86,	90	sound exposure level (SEL), 3-8
40	3-88, 3-89, 3-90, 3-91, 3-92, 3-105, 3-106,	91	subsonic flight, 3-9, 3-10, 3-73, 3-76, 3-116,
41	3-127, 3-130, 3-132, 3-134, 3-135, 3-136,	92	3-121, 3-123, 3-127, 3-164, 3-295, 3-313,
42	3-137, 3-138, 3-142, 3-147, 3-151, 3-153,	93	4-13, 4-21
43	3-154, 3-156, 3-158, 3-159, 3-171, 3-172,	94	supersonic flight, 3-3, 3-10, 3-11, 3-18, 3-73,
44	3-175, 3-179, 3-194, 3-196, 3-197, 3-209,	95	3-74, 3-76, 3-116, 3-121, 3-123, 3-124,
45	3-221, 3-223, 3-228, 3-231, 3-232, 3-233,	96	3-127, 3-128, 3-295, 4-13, 4-21
46	3-234, 3-235, 3-236, 3-246, 3-247, 3-255,	97	Public Health & Safety, 1-33, 3-17, 3-24, 3-246,
47	3-265, 3-268, 3-276, 3-280, 3-281, 3-283,	98	3-263, 3-264, 3-306, 3-317, 4-30
48	3-285, 3-289, 3-292, 3-298, 3-299, 3-301,	99	aircraft mishaps, 3-247, 3-248, 3-264, 3-269–
49	3-303, 3-306, 3-309, 3-310, 3-311, 3-312,	100	3-271, 3-272, 3-275, 3-277, 3-280, 3-306,
50	3-313, 3-315, 3-317, 4-18	101	3-317, 4-30
51	Trails-OV, 3-45, 3-61, 3-290, 4-7, 4-16		

1	bird/wildlife-aircraft strike hazard (BASH),	50	springs, 1-32, 1-34, 2-27, 2-36, 2-46, 2-48,
2	2-48, 3-167, 3-172, 3-264, 3-272, 3-276	51	2-50, 2-51, 3-50, 3-56, 3-87, 3-135, 3-139,
3	fire, 1-32, 3-73, 3-102, 3-162, 3-163, 3-172,	52	3-141, 3-142, 3-146, 3-154, 3-167, 3-168,
4	3-239, 3-248, 3-256, 3-264–3-268, 3-271,	53	3-220, 3-221, 3-223, 3-224, 3-225, 3-227,
5	3-273, 3-274, 3-275, 3-276, 3-277, 3-278,	54	3-228, 3-229, 3-233, 3-234, 3-235, 3-304,
6	3-279, 3-280, 3-296, 3-306, 3-314, 4-2,	55	3-316
7	4-3, 4-13, 4-14, 4-18, 4-22, 4-27, 4-30	56	water appropriations, 3-229, 3-233, 3-303,
8	lasers, 3-268, 3-277	57	3-304, 4-29
9	radio frequency, 1-8, 3-269	58	water rights, 1-34, 2-35, 3-219, 3-229, 3-230,
10	safety buffers, 1-11, 1-26, 1-29, 1-30, 2-19,	59	3-233, 3-235, 3-236, 3-238, 3-304, 3-305,
11	2-23, 2-26, 2-38, 3-7, 3-60, 3-63, 3-76,	60	3-316, 4-29
12	3-106, 3-173, 3-176, 3-236, 3-278, 3-285,	61	wilderness, 1-8, 1-9, 1-13, 1-15, 1-16, 1-29,
13	3-294, 3-297, 3-304, 3-307, 3-313, 3-314	62	1-30, 1-31, 1-33, 1-34, 2-3, 2-4, 2-6, 2-8, 2-9,
14	Socioeconomics, 1-34, 2-41, 2-46, 2-52, 3-8,	63	2-14, 2-15, 2-20, 2-21, 2-41, 2-43, 2-51, 2-52,
15	3-92, 3-93, 3-96, 3-98, 3-100, 3-101, 3-102,	64	3-7, 3-23, 3-26, 3-40, 3-50, 3-51, 3-52, 3-53,
16	3-103, 3-105, 3-106, 3-107, 3-108, 3-109,	65	3-55, 3-58, 3-60, 3-64, 3-65–3-92, 3-171,
17	3-110, 3-293, 3-312, 4-19	66	3-172, 3-178, 3-182, 3-193, 3-215, 3-227,
18	U.S. Fish and Wildlife Service (USFWS), 1-2,	67	3-271, 3-277, 3-289, 3-292, 3-293, 3-293,
19	1-8, 1-9, 1-26, 1-30, 1-31, 1-32, 2-13, 2-14,	68	3-297, 3-298, 3-301, 3-307, 3-311, 3-312,
20	2-15, 2-20, 2-21, 2-26, 2-31, 2-33, 2-34, 2-36,	69	4-16, 4-18, 4-19
21	2-37, 2-48, 2-49, 3-7, 3-41, 3-42, 3-44, 3-48,	70	primitive, 2-52, 3-48, 3-62, 3-66, 3-67, 3-70,
22	3-50, 3-51, 3-52, 3-53, 3-60, 3-61, 3-65, 3-66,	71	3-71, 3-73, 3-74, 3-77, 3-78, 3-79, 3-80,
23	3-67, 3-73, 3-77, 3-78, 3-80, 3-82, 3-92, 3-99,	72	3-81, 3-84, 3-85, 3-88, 3-89, 3-99, 3-124,
24	3-106, 3-107, 3-108, 3-132, 3-137, 3-141,	73	3-292, 3-311, 3-312, 4-19
25	3-146, 3-147, 3-151, 3-158, 3-161, 3-169,	74	scenic, 1-33, 3-48, 3-50, 3-51, 3-55, 3-62,
26	3-170, 3-171, 3-174, 3-179, 3-184, 3-185,	75	3-66, 4-18
27	3-196, 3-217, 3-218, 3-229, 3-235, 3-238,	76	solitude, 2-52, 3-66, 3-67, 3-70, 3-71, 3-73,
28	3-240, 3-241, 3-245, 3-247, 3-263, 3-264,	77	3-74, 3-78, 3-79, 3-80, 3-81, 3-83, 3-84,
29	3-267, 3-268, 3-271, 3-276, 3-278, 3-279,	78	3-85, 3-86, 3-88, 3-89, 3-91, 3-292, 3-293,
30	3-280, 3-286, 3-289, 3-298, 3-301, 3-302,	79	3-311, 4-19
31	3-303, 3-307, 4-9, 4-23, 4-26, 4-31	80	unconfined recreation, 2-52, 3-66, 3-67, 3-71,
32	Visual Resources, 1-33, 3-50–3-56, 3-63, 3-65,	81	3-73, 3-74, 3-77, 3-78, 3-79, 3-80, 3-81,
33	3-310	82	3-84, 3-85, 3-88, 3-89, 3-292, 3-311,
34	Dark Skies Initiative, 3-51	83	3-312, 4-19
35	light pollution, 1-33, 3-51, 3-52, 3-53, 3-55,	84	untrammelled, 3-50, 3-59, 3-64, 3-66, 3-71,
36	3-56, 3-58, 3-59, 3-73, 3-289, 3-290,	85	3-78, 3-79, 3-80, 3-81, 3-91, 3-289, 3-291,
37	3-291, 3-310, 3-311, 4-17	86	3-292, 3-310, 3-311, 4-17, 4-18, 4-19
38	naturally dark night sky, 1-33	87	Wilderness Areas, 3-65, 3-66, 3-67, 3-68,
39	viewer exposure, 3-50	88	3-69, 3-70, 3-71, 3-73, 3-74, 3-76, 3-77,
40	viewer sensitivity, 3-50	89	3-78, 3-79, 3-81, 3-82, 3-83, 3-84, 3-85,
41	Water Resources, 1-34, 2-34, 2-35, 2-41, 2-50,	90	3-86, 3-87, 3-88, 3-89, 3-90, 3-91, 3-92,
42	2-52, 3-56, 3-83, 3-87, 3-90, 3-141, 3-142,	91	3-292, 3-293, 3-293, 4-16, 4-18, 4-19
43	3-218, 3-220, 3-221, 3-222, 3-224, 3-227,	92	wilderness quality, 3-73, 3-77, 3-80
44	3-229, 3-230, 3-237, 3-238, 3-303, 3-304,	93	Wilderness Study Areas (WSAs), 3-65, 3-67,
45	3-316, 4-27	94	3-68, 3-70, 3-73, 3-76, 3-77, 3-79, 3-81,
46	seeps, 1-32, 2-36, 2-46, 2-48, 2-50, 2-51,	95	3-82, 3-83, 3-84, 3-85, 3-86, 3-87, 3-88,
47	3-135, 3-139, 3-141, 3-142, 3-146, 3-167,	96	3-89, 3-90, 3-91, 3-92, 3-292, 3-293,
48	3-168, 3-220, 3-221, 3-223, 3-224, 3-227,	97	3-293, 4-16, 4-18, 4-19
49	3-233, 3-234, 3-235		